Foreign Direct Investment, Intra-organizational Proximity, and Technological Capability: The Case of China's Automobile Industry

by

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To my parents

尊敬하는 父母님께 本論文을 獻呈합니다.

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Abstract

This dissertation consists of three self-contained essays, each of which examines part of the causal link among inward/outward foreign direct investment (FDI), intra-organizational proximity, and in-house technology development performances.

The first essay explores why international joint ventures (IJVs)—an FDI-hosting arrangement often employed by the global South to strengthen foreign investors' commitment to local economic development—may lead to only partial success in nurturing local technological capability. The experience of China's passenger vehicle sector demonstrates that, in the existence of a substantial technological-capability gap between alliance partners, the IJV arrangement is likely to create a "passive" learning mode where foreign firms determine what, when, and how their local IJV partner firms should learn. Accordingly, learners using this IJV arrangement may be able to strengthen their production capability, where interests of both IJV partner firms often converge, but it leaves their project-execution and innovation capabilities largely undeveloped.

The second essay discusses how outward FDI can complement the IJV-based technological capability-building process, through an analysis of the Shanghai Automotive Industry Corporation (SAIC) case. When a firm is upgrading its technological capability, outward FDI can allow learners to have access to human-embedded skills and knowledge and other intellectual assets that are hardly accessible through the inward globalization strategy. Access to a wide range of external resources is a critical ingredient for improving technological capability, and it can also promote self-learning capability by encouraging subsequent learning-by-doing practices. Accordingly, outward FDI can augment "active" nature in the "passive" learning mode created by the inward globalization strategy.

The last essay examines why intra-organizational proximity matters for the technological catch-up process, through a comparison of the Chinese Big Three automotive groups. As a firm's asset-seeking inward/outward globalization strategy and domestic mergers are accompanied by substantial growth in their organizations and assets, intra-firm governance affects the internalization outcome of the acquired assets. The comparative analysis demonstrates that SAIC surpasses the First Automotive Works and the Dongfeng Motor Group in terms of in-house technology development partly because the former has managed its corporate growth within a tight geographical and relational space, compared to the latter. Intra-organizational proximity contributed to SAIC's technological capability-building process by encouraging the sharing and integration of acquired resources across sub-operational units, thus creating group-wide synergy for the effective internalization of the resources.

Dissertation Supervisor: Alice H. Amsden (MIT)
Readers: Karen R. Polenske (MIT) and Calestous Juma (Harvard)

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This dissertation carries my name only, but I am indebted to many people for its completion.

First of all, I would like to thank my dissertation advisory committee members for their excellent academic guidance and encouragement. Alice H. Amsden, my faculty advisor and dissertation committee chair, is the primary reason that I decided to come to MIT: her 1989 work *Asia's Next Giant*, in particular, greatly influenced my doctoral research agenda. While working with her, I broadened my research horizons to include comprehensive economic development topics and refined the central arguments of this dissertation work. I am also grateful to Karen R. Polenske for her insightful comments and constructive suggestions—this dissertation owes its improved draft quality to her line-by-line feedback. Karen also strengthened my interest in China's automotive industry, and her rich knowledge and experience of China were critical assets for conducting my field research and case studies. And I thank Calestous Juma for inspiring me to pay attention to the technology and innovation dimension of economic development and for influencing me to further think of what critical implications I could draw for other developing countries. I specially appreciate his encouragement when I was temporarily lost right after my dissertation colloquium.

The primary data for this research are drawn from the 25 in-depth interviews that I conducted in China and Korea in the winter of 2007 and the summer of 2008. I deeply appreciate the valuable input from all of the interviewees, who are managers, engineers, public servants, journalists, and researchers from China's major automotive groups, Sino-foreign auto assembly joint ventures, Chinese subsidiaries of global automakers, Chinese government institutions, China-based supply firms, China's automotive magazines, and China- and Korea-based research institutes. However, I regret being unable to list their names here due to my confidentiality obligation.

I owe a great debt to many others during my field research in China. I first thank my wife (and my closest MIT colleague) Xin Li for her comprehensive contributions to the fruitful completion of my field trip; she contacted Chinese interviewees on my behalf, set up their interview schedules, translated interview questionnaires, and interpreted conversations during the actual interview process. I also sincerely appreciate help from Wang Li (National Development and Reform Commission), Xiaohui Chen (Jiangsu Province Planning Society), Yilun Xu (Nanjing University), Jie Liu (Beijing Institute of Economic Management), Baolin Tan (Dongfeng Motor Group), and Kichan Kim (Catholic University of Korea) in building local contacts for interviews. Last, my former and current MIT colleagues Hongliang Zhang, Xiaodong Wang, and Jianxi Luo assisted me greatly in contacting Chinese automotive experts.

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The MIT Library was a savior when I had trouble getting access to some integral information sources for my research, such as Fourin's monthly magazine on China's auto industry, due to financial burdens. The library always responded positively and promptly to my requests for purchases or inter-library borrowing. In particular, I thank Dewey librarians Millicent R. Gaskell and Dana Goblaskas for their sincere support. I also appreciate Charles Fine, Director of the International Motor Vehicle Program (IMVP), for giving me authorization for full access to the IMVP's online publication inventory.

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Finally, I sincerely thank my family for their unconditional love and invaluable support throughout the long journey of my Ph.D. work. I dedicate this dissertation to my parents, who have sacrificed much of their individual lives for their son's graduate education: they set up parental role models for me. Also, I am lucky to have my wonderful parents-in-law. Without their help, it would have been impossible for me to keep working on my dissertation after Ian's birth. I thank my sister's family—Hyun-Uk, Duck-Jung, and Siho—for cheering me up whenever I was in a slump. Last, but not least, I am greatly thankful to my wife Xin Li and my 19-month old son Ian for giving me the motivation and energy to finish this dissertation. I admire Xin's multi-tasking capability as a wife, as a mom, and as a doctoral student—she is simply a super wife. I am also proud that Ian has managed diverse living environments so well—he often surprises me with a maturity beyond his years.

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Abbreviations

AMC	American Motors Corporation
CARI	Changchun Automotive Research Institute
CATARC	China Automotive Technology and Research Center
CKD	completely knocked-down
DF	Dongfeng
DFM	Dongfeng Motor Group (formerly known as the Second Automotive Works)
DFPVC	Dongfeng Passenger Vehicle Company
EMNC	emerging-market multinational corporation
ESC	electronic stability control
FAW	First Automotive Works
FDI	foreign direct investment
GM	General Motors
HAG	Hainan Automotive Group
HAW	Hainan Automotive Works (predecessor of HAG)
HKM	Hyundai-Kia Motors
HQ	headquarters
IJV	international joint venture
IS	import substitution
ISI	import substitution industrialization
JV	joint venture
KIET	Korea Institute for Industrial Economics and Trade
M&A	merger and acquisition
M-form	multidivisional organizational structure
MNC	multinational corporation
MOFTEC	Ministry of Foreign Trade and Economic Cooperation
MPV	multi-purpose vehicle (e.g., van)
NAG	Nanjing Automotive Group
NBSC	National Bureau of Statistics of China
NDRC	National Development and Reform Commission, P.R. China
OEM	original equipment manufacturing/manufacturer
PATAC	Pan Asia Technical Automotive Center
PSA	Peugeot Citroën Automotive Group (Peugeot Société Anonyme)
R&D	research and development
RMB	renminbi (Chinese yuan)
SAIC	Shanghai Automotive Industry Corporation
SAW	Second Automotive Works
SDPC	State Development and Planning Commission, P.R. China
SGM	Shanghai General Motors
SIMEE	Shanghai Institute of Mechanical and Electrical Engineering
SKD	semi knocked-down
SOE	state-owned enterprise

STAC	Shanghai Tractor and Automobile Corporation
SUV	sports utility vehicle
SVW	Shanghai Volkswagen
SYM	Ssangyong Motor
TAG	Tianjin Automotive Group
TWMNC	Third World multinational corporation
UNCTAD	United Nations Conference on Trade and Development
VCC	Vale Columbia Center
VW	Volkswagen
WTO	World Trade Organization

Overview

Foreign Direct Investment, Intra-organizational Proximity, and Technological Capability

Developing countries have long been interested in nurturing local technological capabilities in order to move up the global value chain. They have been active in hosting foreign direct investment (FDI), which is often called knowledge-embedded capital, seeing it as one of the most effective and feasible vehicles for technology transfer. However, a higher presence of FDI does not always ensure better local technological capability, and the FDI-based inward globalization strategy often fails to serve as an effective means of technological catch-up. Empirical studies suggest that FDI's long-term contribution to host economies, particularly from a local technology-development perspective, is uncertain in both its sign and magnitude.

In this study, I explore the following two questions. One is why the FDI-based technological catch-up strategy in the developing world often ends up in only partial success; the other is how latecomers can overcome the limitations involved in the FDI-based catch-up model to improve their technological capability. These questions may primarily interest scholars in the fields of development studies, business strategy, or industry research, but the topics of technology transfer and technological capability-building in the developing world may bequeath important implications to much broader academic fields. For example, scholars of environmental studies and science may also see the topic's relevance to their concerns, as global environmental damage may not be able to be mitigated substantially unless the majority of developing countries adopt clean and energy-efficient technologies, which demands active technology-transfer activities from the developed world and intensive self-initiated capability-building practices in the developing world.

To explore the main research questions specified above, I focus on the two-decade experience of China's modern passenger-vehicle sector development. A primary fact that draws my attention in the case selection is that the inward globalization model for China's passenger-vehicle sector, based on the international joint venture (IJV) requirement with a strict control of non-Chinese equity-share in each IJV, has not yet met its ultimate goal of nurturing Chinese automakers' technological capabilities according to global standards. This goal has not been met, although huge domestic market potentials have given China the critical advantage, which is rarely found in other developing countries, of attracting foreign direct investment (FDI) and influencing foreign investors to commit to local technology development. Through detailed studies of major firms in China's passenger-vehicle sector, I intend to demonstrate that (i) the partial success of China's "exchange-market-for-technology" strategy is due to the limitation inherent in the strategy itself rather than to the inappropriate implementation of the strategy; and (ii) for a more comprehensive technological catch-up, thus, the sector would need to incorporate some alternative approaches that can complement what is missing in the FDI-based learning model.

In the first chapter, I focus on the cases of Shanghai-Volkswagen and Shanghai-General Motors, which are often considered two of the most "successful" Sino-foreign auto-assembly joint ventures (JVs). These case studies demonstrate that even the two leading IJVs have limited their contributions to local production-capability building without nurturing local project-execution and innovation capabilities. The primary reason was the "passiveness" inherent in the IJV-based learning model, where multinational corporations control the contents, timing, and method of learning for local JV partner firms and which discourages learners from being proactive in building project-execution and innovation capabilities on the basis of their improved production capability. Given the substantial gap in technological capability between IJV partners, local firms have only limited opportunities to overcome the passiveness.

In the second chapter, then, I ask what learners can do to surmount the challenge raised by the inward globalization model in the midst of building technological capability. To draw implications, I analyze the case of the Shanghai Automotive Industry Corporation (SAIC), which has been leading China's passenger-vehicle sector in terms of market share and in-house technology development and, at the same time, has held a larger stock of overseas investment than any other Chinese automaker. The SAIC story tells us that outward FDI, if used in an appropriate way, can complement the IJV-based learning model substantially in terms of the following aspects. First, acquired foreign assets have formed base technologies, which provide SAIC a starting point for initiating a series of new vehicle development projects and to which SAIC gradually added innovations through self-application practices. Second, outward FDI has allowed SAIC to establish broad access to external knowledge and skills embedded in humans, and this broad access has helped SAIC internalize the capability underlying external technologies together with the technologies themselves. Finally, SAIC's improved technological capability, thanks mainly to outward FDI and subsequent learning-by-doing practices, has strengthened its IJV partner firms' commitment to China-based technology development projects. The key implication from the SAIC case is that latecomers can turn into "active" learners from "passive" ones with their outward globalization scheme.

In the last chapter, I highlight intra-organizational proximity as another key factor that can affect technological capability-building outcomes. My central argument in this chapter is that how to utilize acquired external resources to maximize firm-wide synergy is as important as how to establish access to target external assets, and intra-organizational proximity is one critical factor, particularly for M-form organizations to facilitate such synergy-creating process through internal knowledge integration and sharing. To demonstrate this point, I compare SAIC with the First Automotive Works (FAW) and the Dongfeng Motor Group (DFM), SAIC's two principal domestic rivals. All of the three firms in the past were single-factory firms, but now they have become large multi-divisional automotive groups as a result of their growth and knowledge-acquisition strategies, involving new IJV establishment and domestic/cross-border mergers and acquisitions. My comparative study of the three firms shows that (i) SAIC's in-house vehicle development capability, considerably ahead of FAW's and DFM's, is partly due to its effective intra-group governance system, optimized to mobilize internal resources for group-wide technological learning; and (ii) SAIC's intra-organizational proximity has been a critical asset in creating the governance system.

As usual in most qualitative studies, my study may also be susceptible to critiques regarding the reliability of the interview-based primary data that its central argument depends on or about the generalizability of its central argument based mainly on the case of China's automotive industry. My research, however, may be shielded from such critiques, in the following sense. First, I made substantial efforts to minimize individual biases that may be involved in the interview process and to determine the credibility of the information collected through interviews. Most of my firm interviews were conducted with mid-high level managers and senior engineers, who had extensive knowledge about corporate strategies, history, and in-house technology development. To avoid personal biases, I asked the same questions of multiple interviewees, and adopted only the answers supported by more than one interviewee, in most cases. In addition, whenever possible, I cross-checked the interview-based primary data with the information from various secondary sources, such as statistics yearbooks, automotive magazines, newspapers, etc. In general, I used only the primary data that were confirmed by other reliable sources, throughout this study.

The second kind of critique, on generalizability, would be largely irrelevant, as I do not intend to generalize the case of China's automotive sector to other industries or countries. Instead, the main goal of my research is to offer one possible approach to explain why the FDI-based learning model adopted by developing countries is often less successful than expected and how some latecomers have successfully overcome the limitations of the model. In each chapter's concluding section, however, I try to provide key lessons or implications drawn from my case studies, which may convey general insights into the FDI-based catch-up in the developing world, Third World Multinationals, or proximity within an M-form organization. In this respect, the primary value of this study is that it enriches the currently sparse literature on the topic of the new technological catch-up model, which involves *outward* as well as *inward* globalization (thus, gives rise to Third World Multinationals) and has been adopted actively by large emerging economies like China and India.

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Chapter I

Learning through the International Joint Venture: Lessons from the Experience of China's Automotive Sector

"In carrying out in-house technology development projects, we have not benefited much from our collaboration with foreign automakers. We have done almost all for ourselves."

— A senior engineer, Dongfeng Group[1]

"We did everything we promised to do."

— Philip Murtaugh, former CEO of GM China[2]

1. Introduction

Foreign direct investment (FDI) is distinguished from other types of global financial transactions in that knowledge is embedded in it (Hymer, 1960). Multinational corporations (MNCs), the main agent of FDI, bring their knowledge and know-how, as well as tangible capital, to host economies in the process of managing their overseas operations and assets. The international joint venture (IJV) is one particular form of FDI arrangement, where an MNC jointly controls overseas operations in partnership with other MNCs or local firms. MNCs prefer IJV partnerships with local firms to other FDI arrangements, particularly when they enter emerging markets where substantial risk and uncertainty exist. FDI hosts may also favor the IJV arrangement because, with the IJV arrangement, FDI hosts can influence MNCs to strengthen commitment to local economic development—if local participation in the arrangement is assumed—while building linkages to global production or distribution networks. More importantly, IJVs may allow local firms to access knowledge embedded in the hosted investment better than other alternative FDI

[1] Excerpted from Interview #21.
[2] Quoted in Gallagher (2006), p. 63.

arrangements do because the former by nature presuppose certain degrees of cooperation and collaboration between the equity holders.

The IJV arrangement has been at the center of China's "exchange-market-for-technology" strategy for its passenger vehicle sector development (SDPC, 1994). Since 1983, the Chinese central government has granted foreign automakers access to its domestic market, as long as they operate China-based joint ventures (JVs) in collaboration with Chinese firms. A JV's non-Chinese parties combined cannot claim more than a 50% stake for each of their Sino-foreign JVs, and each JV project is reviewed every two to three decades, depending on its initial contract. In the early period of foreign entry into the Chinese market, foreign passenger vehicle imports were subject to strict import quota or tariffs, although these protectionist measures were either repealed or loosened substantially after China's accession to the World Trade Organization (WTO) (Harwit, 2001). This controlled inward globalization approach ultimately aims to build a sound local automotive sector and to incubate technologically competitive local automakers within a short period of time (Chu, 2008). China's government expected that the IJV arrangement, in combination with its leverage power from China's huge market potentials, would effectively induce MNCs to be good teachers for their local JV partners.

However, skepticism is growing concerning the JV-based catch-up model. Without doubt, the Sino-foreign JV arrangement worked well for import substitution (IS); as of 2009, China had developed the world's second largest passenger car market, and over 95% of the market's demand was fulfilled by domestic-produced volume. Even a quarter century since the adoption of the IJV model, however, was not long enough to incubate a technologically competitive local auto producer: as of 2009, foreign-licensed models still captured over two-thirds of China's domestic passenger car market.[3] The link between the IJV model and technological catch-up seems even weaker, given that the domestic market share, captured by Chinese independent brand models, was in large part due to the rise of minor local independent automakers, such as Chery and Geely, which have neither operated auto assembly IJVs nor been main beneficiaries of China's automotive industry policy (Lu and Feng, 2005). In this sense, it seems difficult to say that the IJV model has met the expected technological catch-up schedule.

My research question in this study is why IJV-based local technological capability building in China's automotive sector has been so slow and yielded little, despite some favorable conditions, such as the Chinese government's active support for the catch-up model's success and China's seemingly strong bargaining power against foreign actors (thanks to its huge domestic market). Is the poor outcome because of the inherent nature of the IJV-based catch-up model itself or is it due to an inappropriate implementation of the model or some other reasons? My main hypothesis is that the IJV arrangement in itself provides local firms with only "passive" and "incomplete" learning opportunities because foreign firms, which have superior technological capabilities, can effectively control various aspects of the main access channel to their strategic assets (knowledge and skills, in particular) and they take the actual initiative in governing their JVs' key technical affairs. In this respect, I follow in the footsteps of Hymer (1960).

2. Theoretical Framework and Method

My conceptual lens for this study is built on two propositions. One is that the core competency of a high market-performer derives from its competitive capabilities for production, project

[3] In 2009, 5.7 million (roughly 69%) out of 8.3 million units of passenger vehicles sold in China—excluding two million units of minibuses, often classified as commercial vehicles—were foreign-branded sedans and recreation vehicles produced by Sino-foreign assembly JVs (Fourin, 2010).

execution, and innovation (Amsden and Hikono, 1994); the other is that the outcome of technological capability-building process of a firm lacking its own technological assets depends on the firm's ability to take advantage of its production capability to nurture project-execution and innovation capabilities (Lall, 1992).

As previously mentioned, I hypothesize that in the existence of substantial technological gap between partner firms, the contribution of the IJV arrangement to such technological capability-building process is, by and large, confined to the local firm (i.e., the learner)'s improved production capability. In my theoretical framework, the rationale for the hypothesis includes: (i) what the foreign firm transfers to the local firm through the IJV arrangement is mostly the *outcome* of technological capability, rather than technological capability itself; (ii) the IJV arrangement tends to encourage the local firm to master the transferred knowledge and skills (thus, to improve production capability) while discouraging the firm from searching for their alternative or new uses; (iii) the IJV arrangement leaves little maneuvering space for the local firm, and the local firm does not have actual power to change this condition; (iv) the IJV lacks innovation capability, and the foreign firm takes a dominant part in the IJV-related investment projects; and (v) thus the local firm can hardly find a way to take advantage of its improved production capability to nurture project-execution and innovation capabilities, depending solely on the IJV arrangement. Figure 1-1 illustrates my conceptual lens, explained above.

I test the main hypothesis with a detailed case study of Shanghai-Volkswagen (SVW) and Shanghai-General Motors (SGM), the two IJVs affiliated with the Shanghai Automotive Industry Corporation (SAIC). The case study aims to demonstrate that (i) in the existence of a substantial technological-capability gap between alliance partners, the IJV arrangement is likely to create a "passive" learning mode where teachers, not learners, determine what, when, and how

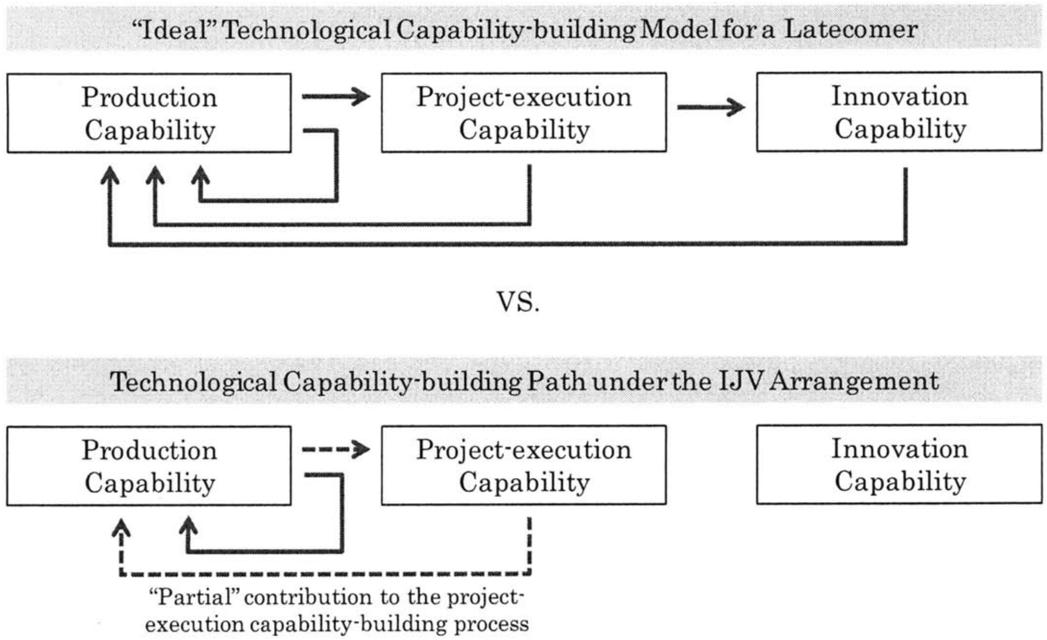

Figure 1-1: Conceptual Lens for This Study

to learn; and (ii) accordingly, the IJV's contribution may be substantial in building local production capability, where IJV partner firms share common interests, but the contribution may be marginal in nurturing local project-execution and innovation capabilities, due to the conflict of interest between the IJV partner firms. If the SAIC case validates my hypothesis, then it would support my view that regardless of its implementation, the IJV-based *inward* globalization model is doomed to at best *partial* success in upgrading local technological capability, due to the passive nature of the learning mode itself inherent in the model.

I chose SVW and SGM as case study subjects because they are among the best practices of the Sino-foreign JV arrangement. Both IJVs not only have captured a large portion of the local passenger car market[4] on the basis of active technology transfer and localization activities, but

[4] As of 2009, SVW and SGM were the top two passenger vehicle makers in China, in terms of annual sales. Both

also have developed better, though incomplete, in-house vehicle development capabilities[5] than their other rival Sino-foreign JVs. For this reason, the case of SVW and SGM, as two exemplary IJV practices in China's automotive sector, can help us distinguish what key issues may underlie the IJV arrangement as a technological learning device.

For primary data collection, I conducted 25 in-depth interviews in winter 2007 and summer 2008. Each interview lasted one to two hours, was based on semi-structured but open-ended questionnaires. Interviewees included current and former employees (primarily, managers and engineers) of China's five major automotive groups[6] and their IJVs[7]; China's central and local government officials; and other potential information holders, including journalists, consultants, and researchers in the Chinese automotive field. In addition, I made two manufacturing plant visits (SGM's Shanghai plant and Dongfeng-Honda's Guangzhou plant) for plant-level data collection purposes. I complemented the primary data, collected through interviews and plant visits, with various secondary sources, including the China Automotive Industry Yearbook and the Fourin China Automotive Intelligence.

3. Literature Review

Three sets of existing studies provide critical insights into this research topic, as to inward FDI and technological catch-up. I review here the development literature on technological capabilities,

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IJVs sold 728,238 units and 708,356 units, respectively, during the whole year (Fourin, 2009).

[5] As of 2009, GM is the only foreign automaker that operated a sizable independent local technical center, called the Pan Asia Technical Automotive Center (PATAC), in partnership with a local firm. Also, SVW and SGM have invested more in their in-house R&D than most other Sino-foreign JVs (for further details, see Table 2-3 in Chapter 2 of this dissertation volume).

[6] The five automotive groups include SAIC, the First Automotive Works (FAW), the Dongfeng Motor Corporation (DFM), the Guangzhou Automotive Group (GAG), and the Beijing Automotive Industry Corporation (BAIC).

[7] The IJVs include SVW, SGM, PATAC, Dongfeng-Honda, FAW-VW, Guangzhou-Honda, Guangzhou-Toyota, and Beijing-Hyundai.

the economic literature on FDI and local economic development, and the business literature on the JV as a strategic alliance institution.

3.1. Knowledge, Learning, and Technological Capabilities

Knowledge is a critical production factor, but access to specific knowledge is challenging and costly. Valuable knowledge in general exists in a tacit form, and this very characteristic of knowledge raises difficulty in transacting it in the market place (Polanyi, 1966). Asymmetric information between the consumers and suppliers of specific knowledge may also inhibit the formation of an efficient market system for knowledge. Rent-seeking behavior is another obstacle in having access to needed knowledge at the appropriate time (Amsden, 2001). Creating knowledge, however, is not necessarily an easier alternative to buying it, given the cumulative nature of knowledge (Kline and Rosenberg, 1986). In general, making knowledge is more costly and difficult than buying it, unless the producer already has a solid knowledge base and internal innovation capability.

Technology, by nature, is knowledge; it is "the organization of knowledge for practical purposes" (Mesthene, 1969: 492). Accordingly, technology shares basic characteristics with knowledge; it is also hard to access and create. At a micro level, technology defines the nature of a firm's product and production function. The technology currently available to a firm directly affects the firm's immediate market performance. Each firm's competitive advantage depends substantially on its ability to employ available technologies in a more efficient way and to create improved technologies on the foundation of existing ones. Such an ability at the firm level can be termed a firm's "technological capability." Technology is an outcome of technological development activities, and their efficiency and effectiveness are determined by a firm's technological capability.

A competitive firm in general has three kinds of technological capabilities: (i) production, (ii) project execution, and (iii) innovation capabilities (Amsden and Hikino, 1994). Production capability refers to a firm's ability to monitor, maintain, optimize, and improve existing manufacturing operations in order to meet higher efficiency and quality standards. Project-execution capability, which is also called investment capability (Westphal *et al.*, 1985), includes a wide range of skills and know-how, with which a firm can successfully establish a new operation or expand the existing ones. Innovation capability is a firm's capacity to create new knowledge (or improve existing knowledge) or to apply it to practical or commercial uses through ingenious combinations of preexisting (whether internal or external) knowledge, skills, and other resources. Although market leaders usually use their competence in innovation as sources of improving other aspects of their technological capabilities (e.g., investment and production), latecomers often reverse the sequence due to their insufficient innovation capability; that is, many latecomers use production capability, developed from the acquired technology, as fundamental sources of their improved investment and innovation capabilities (Dahlman *et al.*, 1987).

As latecomers initiate their technological capability-building process on the basis of external knowledge, their technological development depends substantially on their learning ability (Amsden, 1989). A firm's learning performance is a function of the firm-level absorptive capacity, which Cohen and Levinthal (1990: 128) define as "a firm's ability to recognize the value of external knowledge, assimilate it, and apply it to commercial ends." On the one hand, the absorptive capacity depends on the pre-existing internal knowledge base as knowledge is cumulative and mutually complementary. A better understanding of the nature and value of external knowledge can be established when a firm already has enough knowledge relevant to it.

On the other hand, intense internalization efforts nurture higher absorptive capacity (Kim, 1995). The complete transfer of valuable knowledge is challenging due to its lack of explicitness; external knowledge is thus effectively internalized through various efforts to explore and absorb more of its tacit dimension, such as in-house R&D activities and learning-by-doing practices. A simple adoption of external technology would not lead to a fruitful learning, unless it is accompanied by intense assimilation and recreation practices. In this sense, learning is more than mastering acquired knowledge and skills.

Building and improving technological capabilities is not an option but a "must" for a firm's sustainable growth (Lall, 1992). Without strong technological foundations, the low-cost advantage, which latecomers from the developing world often possess thanks to location-specific factor prices, may be fragile, as it is sensitive to various external conditions that the latecomers themselves cannot control. More stable sources of a firm's growth can be created when the location-specific advantage is transformed into a firm-specific one (Dunning, 1977). Technological capability is at the heart of this transformation process, and the developing world has had serious concerns about how to nurture local technological capabilities (Wesphal *et al.*, 1985; Dahlman *et al.*, 1987; Amsden, 1989; Wade, 1990; Kim, 1997).

3.2. FDI and Its Impacts on Host Economies

Is FDI's net-impact on host economies positive or negative? A substantial body of literature has explored this question, but conclusive answers are not yet established. From a host economy's perspective, FDI is a double-edged sword as potential positive and negative dynamics coexist in it (Aitken and Harrison, 1999). On the one hand, FDI may induce positive spillovers in host economies. The local presence of foreign firms can help domestic firms improve their productivity and market performance through official transfers of advanced technology and know-how or through the unintended spillover mechanism. FDI-driven output growth can also lead to an improvement in intermediate sectors' competitiveness in terms of scale and output quality. On the other hand, FDI may have crowd-out impacts on host economies. MNCs' market entrance may weaken indigenous development dynamics by encroaching on domestic firms' market share. Shrunken market share can push local firms into operation at a sub-optimal scale, which, in turn, is likely to weaken their market positions further and discourage new investments by local players. As the net of the two opposing forces—the spillover and crowd-out effects—can differ by location, sector, and time, FDI's impact on host economies is hard to generalize (Javorcik and Spatareanu, 2005).

The spillover effect can happen either in horizontal or vertical directions. Horizontal spillovers occur between MNCs and their local competitors. Besides official technology transfer arrangement, local firms may be able to improve their productivity or product quality by imitating MNCs' production technologies or marketing skills through market research (Blomström and Kokko, 1998), whose process can be accelerated by labor mobility between indigenous local players and foreign-invested firms (Blalock and Gertler, 2005). In some cases, more intense market competition, triggered by MNCs' market entry, can encourage local firms to be more productive and innovative (Blomström and Kokko, 1998). This type of spillover, however, may be quite limited in reality, because MNCs tend to minimize the possibility of horizontal spillover by tightening controls over their intellectual properties (Javorcik, 2004) or by monopolizing local talents through high wages (Lipsey, 2004).

Spillovers can also happen vertically. MNCs may be willing to provide local parts suppliers with opportunities for technical assistance or professional training, if they are closely related through forward/backward linkages. Also, high quality-standards for local procurement, set by MNCs, can indirectly contribute to local firms' technological development (Lall, 1978; Moran, 2001). Moreover, MNC-generated local demands can help local firms achieve higher economies of scale (Moran, 2005). Vertical spillovers face fewer obstacles than horizontal spillovers, because the former are often mutually beneficial to both MNCs and local firms: better local parts lead to higher quality final goods. Thus, vertical spillovers are more frequently found in reality than horizontal ones (Javorcik and Spatareanu, 2005).

A set of empirical studies test FDI's net-impact on host economies, but the test results somewhat diverge (Table 1-1). While many studies found statistically significant positive links between the presence of FDI and the productivity of host economies, others found negative correlations between them or failed to find any significant relationships. Inconsistent outcomes in the table may reflect some methodological issues. One example is measurement errors and the uncertainty involved in data or in some key parameters (e.g., output and productivity measures)

Table 1-1: Selected Studies on South-received FDI's Productivity Spillovers

Authors	*Country*	*Year*	*Data*	*Unit of Analysis*	*Result*
Blomström and Persson (1983)	Mexico	1970	Cross-sectional	Industry	+
Blomström (1986)	Mexico	1970, 1975	Cross-sectional	Industry	+
Haddad and Harrison (1993)	Morocco	1985-89	Panel	Firm/Industry	?
Aitken and Harrison (1999)	Venezuela	1976-89	Panel	Firm	-
Djankov and Hoekman (1999)	Czech Rep.	1993-96	Panel	Firm	-
Schoors and van der Tol (2002)	Hungary	1997-98	Cross-sectional	Firm	+
Smarzynska (2002)	Lithuania	1996-2000	Panel	Firm	+
Blalock (2002)	Indonesia	1988-96	Panel	Firm	+
Yeon (2003)	S. Korea	1991-2000	Panel	Firm	+
Javorcik (2004)	Lithuania	1996-2000	Panel	Firm	+
Javorcik and Spatareanu (2005)	Romania, Czech Rep.	1998-2000	Panel	Firm	Romania (+) Czech (-)

Note: "?" indicates mixed outcomes or statistically insignificant results.

of the testing models (Lipsey and Sjöholm, 2005). Another example is ambiguity in the direction of causality. When a statistically significant, positive relationship exists between FDI stock and sector-specific local productivity, it is often hard to tell whether more foreign firms enter the sector where local productivity is already high enough, or the local productivity is high due to the strong presence of foreign firms (Rodrik, 1999).

The different results, however, may simply suggest that FDI's net-impact cannot be generalized as it is a function of certain country-specific or industry/firm-unique conditions. In general, FDI inflows create larger positive externalities when host economies share similar socio-economic conditions with MNCs' home base (Lipsey and Sjöholm, 2005). If local firms and MNCs have too large a gap in terms of productivity or technology, local competitors are likely to be crowded out of the market even before taking advantage of FDI-generated spillovers, and MNCs may be discouraged from generating positive spillovers as it is too costly. This view partly explains why a large fraction of FDI falls into the North-North FDI category.[8]

3.3. The Joint Venture for Strategic Alliance

The JV is an institutional means by which multiple business entities form a strategic alliance to create synergy (Kale *et al.*, 2000). A strategic alliance can take either a non-equity coalition form or an equity-sharing collaboration form. In general, the latter type of alliance creates sturdier inter-organizational ties as the sharing of financial interests reduces the possibility of opportunistic behaviors and raises the level of each party's commitment to the partnership (Scherer, 1980). For this reason, the JV, a typical form of equity-sharing alliance, is often

[8] According to the author's calculation based on World Bank (2006) and the World Development Indicator Database, over three quarters of the total cross-border direct investment flows were among advanced economies, as of 2002. See Chapter 2 for further details.

considered as one of the most effective institutional means to form a solid inter-firm partnership (Mowery *et al.*, 1996). Meantime, strategic alliances can also be categorized into symmetric, asymmetric, and mixed alliances, depending on the degree of the shared interests among alliance parties (Barney, 2007). An alliance is symmetric when each firm has exactly the same incentive to enter into the alliance, while it is asymmetric when each firm has a different motivation; a mixed alliance is in between the two cases. The JV can fall into any of these three categories.

The primary purpose of the JV-based alliance is often more than financial interests. Many firms use the JV arrangement for mutual learning purposes, in addition to incentives for risk and uncertainty management, high scale economies, and low-cost market entry (Inkpen and Beamish, 1997). The JV allows its stakeholders to exchange their mutually complementary assets and to internalize external knowledge and skills (Hamel *et al.*, 1989; Mody, 1993). The JV-mediated technology transfer is often more effective than other transfer arrangements based on market transactions because it can be more inclusive of tacit dimensions of knowledge, with intense intra-JV collaboration and interactions (Mohr and Spekman, 1994).

The JV-mediated knowledge sharing does not always contain a successful learning promise, however. The outcome instead depends on various factors including the gap or the degree of complementarity in core competency between alliance partners. When each JV partner owns a comparably strong core competency, JV partners are more willing to share their internal and exclusive resources with each other (Mowery *et al.*, 1996). A strategic alliance that lacks a balance in core competency is fragile, as motivation to compete may overshadow incentive to cooperate within the partnership (Park and Ungson, 2001). If the purpose of the alliance is mutual learning, inter-dependency and reciprocity are particularly important for its fulfillment (Lane and Lubatkin, 1998). Also, the outcome depends on the degree of similarity in culture, organization, and knowledge base between JV partner firms (Barkema *et al.*, 1996; Inkpen, 2000). The JV is likely to generate more positive outcomes when its stakeholders are very similar in terms of these characteristics.

3.4. Implications for This Study

The following implications can be drawn from the review of the three sets of literature outlined above.

First, a latecomer should nurture, as emphasized in the development-study literature, at least three kinds of technological capabilities (production, project-execution, and innovation capabilities) to become a global player, and needs to utilize its production capability as sources for upgrading project-execution and innovation capabilities. In particular, the dynamic and interactive mechanism, through which production capability leads the project-execution and innovation capability-building process (or the other way around), is critical in cultivating and upgrading overall technological capability.

Second, a substantial body of the FDI literature presents empirical evidence of the positive correlation between the strong presence of FDI and the high market-performance of firms and industries in FDI-hosting economies, but the direction of causality behind the relationship is uncertain. Even when the efficiency of a host economy is assumed to be a function of FDI flows or stock, it is still not clear whether the FDI-driven efficiency increase in the host economy is from the spillover effect (i.e., improvement in local firms' efficiency due to the presence of FDI) or from the crowd-out effect (i.e., replacement of local firms by foreign-invested firms). Accordingly, the FDI-based learning model involves great uncertainty as to its success, because the sign (i.e., whether FDI's net-contribution is positive or negative) and extent (i.e., where FDI can contribute and where else it cannot) of FDI's net-contribution to the host's technological capability-building process has not yet been examined thoroughly or depends on local conditions.

Finally, the management literature demonstrates that the JV arrangement is most likely to work well for mutual learning purposes, when each JV partner has comparably valuable and complementary technological assets and capability. It is ambiguous, however, whether the JV can still serve the same purpose if such a condition is not met. Accordingly, it is highly uncertain how much a firm lacking knowledge-based core competencies can benefit from a JV partnership with other technological leaders in terms of its technological capability-building process.

4. Case Study: Sino-foreign Automotive Assembly JVs

Using the case study of SVW and SGM, this section discusses the strength and weakness of the IJV arrangement as an institutional vehicle to build local technological capabilities. The following analysis focuses on why even a successful local IJV operator has experienced some bottlenecks in upgrading its technological capabilities beyond a certain degree.

4.1. China's Passenger Car Sector in Brief

China has adopted an eclectic approach for its automotive sector development, which is somewhere between Korea's independent model and Latin America's FDI-based model. The Chinese government has granted foreign automakers access to its domestic market but only through one particular form of FDI arrangement—IJVs in partnership with Chinese automakers, where the upper threshold of the total foreign equity share in each IJV is strictly controlled at 50%. This IJV arrangement, strategically chosen for the main purpose of gaining access to advanced skills and knowledge (SDPC, 1994), was expected to fulfill China's ultimate aim at incubating technologically competitive local automakers (NDRC, 2004).

This controlled inward globalization model was effective in the stage of import substitution (IS). Since the arrival of the American Motors Corporation—the first foreign automaker that established a Sino-foreign automotive JV—in 1983, China took only a quarter of a century to create the world's second largest domestic passenger-car market and to build the world's third largest output capacity. Since 1997, almost the entire local passenger-vehicle demand has been fulfilled by domestic-produced volume, and local passenger-car makers have carried out a substantially high portion of their value-added activity within China. The increasing export volume of domestic-produced passenger cars demonstrates that China's passenger car sector has also developed the capability to meet globally competitive productivity and quality standards.[9] As illustrated by these facts, the Chinese automotive sector achieved an impressive IS outcome within a short period of time.

It is questionable, however, whether the FDI-based model has provided Chinese automakers with an effective vehicle for technological catch-up beyond the IS stage. In its 2004 automotive industry policy, China's central government acknowledged that its exchange-market-for-technology strategy ultimately failed to meet its aims, given that Sino-foreign JVs functioned as no more than local assembly bases for MNCs, and that the local firms operating the IJVs still lacked in-house technology-development capability (Chen and Zhang, 2004; Lu and Feng, 2005; Gallagher, 2006). The situation is not much different now; most Chinese automakers still depend on foreign firms for technology, and foreign-licensed passenger vehicles capture roughly two-

[9] In 2009, 122,874 units of passenger vehicles produced in China were exported to other countries. Among them, 55,206 units (45%) went to advanced economies such as North America, Western Europe, and Japan. *Source:* Computed from Fourin (2010).

thirds of the domestic market (Fourin, 2010).

Then why is it the case that the same IJV-based catch-up model may be less effective in the post-IS upgrading stage than in the earlier IS stage? A primary reason may be that the IJV arrangement by nature is effective in nurturing local production capability, which is most crucial in the IS stage, but less effective in promoting local capabilities for other dimensions of the overall technological capability such as capabilities for project execution and innovation, which are also essential in the post-IS upgrading stage. The following case study of SVW and SGM will shed light on the validity of this hypothesis.

4.2. Sino-foreign JVs and Horizontal Knowledge Flows

As noted earlier, the term *technological capability* embraces at least three kinds of capabilities: production, project execution, and innovation. Accordingly, the IJV arrangement's effectiveness in building local technological capabilities needs to be linked with the arrangement's contribution to these three segments of technological capabilities in China's passenger vehicle manufacturing sector. In Section 4.2., I examine how SVW and SGM have helped SAIC nurture each of these three segments.

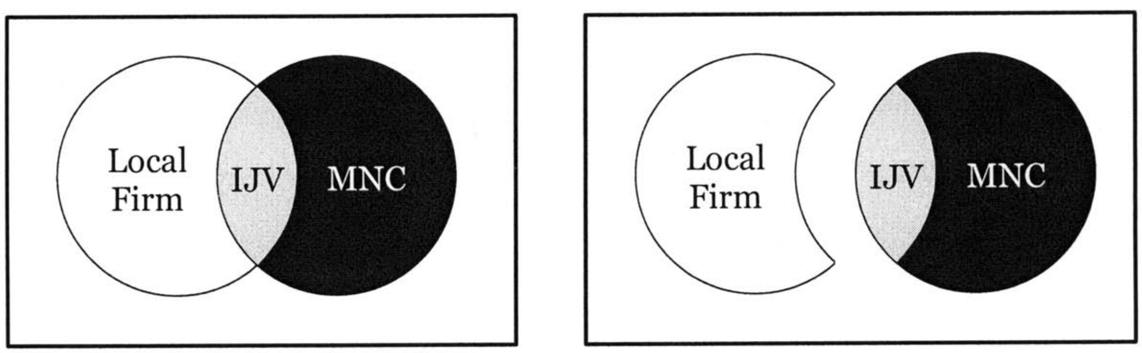
4.2.1. Nature of the Sino-foreign JV Arrangement

Each Sino-foreign JV is a semi-permanent project that is subject to renewal every two to three decades, with the approval of the Chinese central government. In the renewal process, terms and conditions for each JV are supposed to be renegotiated by the JV equity holders. Foreign parties combined cannot claim more than half the total equity of each JV. Literally, each equity holder has the right to participate in the management of JVs in proportion to its share in total equity.

Foreign automakers have accessed China's domestic market under the IJV arrangement, while not being allowed to operate wholly-owned assembly subsidiaries. Before China's accession to the WTO in late 2001, the domestic passenger-car market was highly protected against foreign imports through various public measures like import quotas and tariffs.

Each Sino-foreign JV exists as a separate business entity; it belongs to neither of the JV partner firms. Sino-foreign JVs have their own assets and resources, none of which are under the direct control of each JV partner firm. Their internal assets, including technologies and production equipment/facilities, should be utilized only for the IJVs' own good without being taken advantage of by other business entities, including IJV equity holders. Each Sino-foreign JV also recruits its own people and operates internal training programs for its hires. Similar to other tangible assets, human resources are the IJV's own asset; job rotations between each JV and its stakeholder firms are strictly prohibited. That is, the JV employees are not allowed to work for other business entities at the same time. The only direct connection between JVs and JV partner firms exists at the top management level. Each Sino-foreign JV's top management board consists of several delegates from each JV stakeholder. The number of board members reserved for each JV stakeholder is determined according to its share in the total JV equity. Except for top management, official resource-sharing channels do not exist between Sino-foreign automotive JVs and their equity holders.

Under this arrangement, technology-related knowledge flows are quasi-delinked between each IJV and its Chinese equity holder (Figure 1-2). Foreign JV partners transfer their product-specific technologies to their JVs for local production of the chosen vehicle models. In many cases, foreign equity holders in the Sino-foreign JV are chosen from their headquarters' (HQ) development or engineering department in order to handle such technology transfer processes smoothly and to manage technical affairs within the JV skillfully. In contrast, the Chinese side typically sends its management or marketing people to the JV. To achieve technology transfer, frequent interactions are necessary between the JV and its foreign JV partner. The MNC HQ often sends its own engineers to the JV to assist the JV-hired engineers and shop-floor workers technically so that the transferred technology can be adopted for local production. Human resource exchanges in the opposite direction are not rare, either: JV engineers are often sent to the MNC HQ for training purposes. Accordingly, each Sino-foreign JV can secure an official learning channel in improving its production capability.



(a) An Ideal IJV (b) A Typical Sino-foreign JV

Figure 1-2: Comparison of an Ideal IJV Model and a Typical Sino-foreign JV Practice

This knowledge-transfer process, however, does not leave much room for the Chinese JV partner firm. It has little to offer its JV from a technical standpoint, and it is not allowed to take advantage of the JV's improved technological capabilities, thanks to the technology transfer. Perhaps this practice deviates somewhat from the ideal IJV model that the Chinese government imagined when it formulated the IJV-based catch-up strategy, as skills and know-how accumulated within the IJVs have remained quasi-external to local firms.

4.2.2. IJVs and Production Capability

SVW and SGM conform to the above-described Sino-foreign JV arrangement. Both SVW and SGM are independent business entities, which hire their own personnel and operate and manage their own assets. SAIC has half the total equity share for each JV, and its delegates in each JV's management board are mainly in charge of human resource management, local procurement (except for key capital goods for production), product sales and marketing, and government relations. Volkswagen (VW) and General Motors (GM), whose representatives are primarily responsible for the IJVs' technical affairs, control the other half of SVW and SGM's equity. As of 2009, all of both IJVs' products were respectively VW- and GM-branded vehicles.

SVW, founded in 1985, began its operation with the assembly of imported, completely knocked-down (CKD) kits for the Santana[10], a mid-sized sedan based on VW's 1982 technology. Its beginnings were humble. For the first five years of its operation, SVW used the remodeled Shanghai Tractor and Automobile Corporation (STAC) manufacturing facilities, which were SAIC's non-cash contribution to the JV, without having its own assembly plant. The initial STAC factory with a labor-intensive assembly line had an extremely limited annual production capacity of 5,000 vehicles. Over the next several years, VW renovated the plant to expand SVW's CKD assembly capacity to the level of 75,000 units a year, but SVW's productivity in early periods of its operation was as low as 100 vehicles a day (Posth, 2006).

The lack of skilled labor, as well as dated manufacturing facilities, was responsible for the low productivity. When SVW was in its initial operation, most of its shop-floor workers were rural junior high school graduates without much practical vehicle production experience (Long, 1996). VW sent 35 to 65 German engineers to Shanghai under three-year contracts in order to

[10] The original Santana CKD kit consisted of 5,200 parts and components (Posth, 2006).

train local production workers (Posth, 2006). SVW offered new hires a three-year on-the-job training program, consisting of both lectures and practical training on modern automobile-production system and their missions in SVW's actual production lines (Long, 1996). Only those who completed the three-year training program were placed on production lines (*ibid.*).

After its first modern plant began operations in April 1990, SVW's overall productivity improved substantially. In contrast to the renovated STAC factory, SVW's Shanghai No. 1 plant was built on modern technologies, not only for vehicle and engine assembly but also for other core production processes including pressing, stamping, welding, and painting. SVW's annual production volume increased over seven times, from 15,688 units in 1989 to 115,316 units in

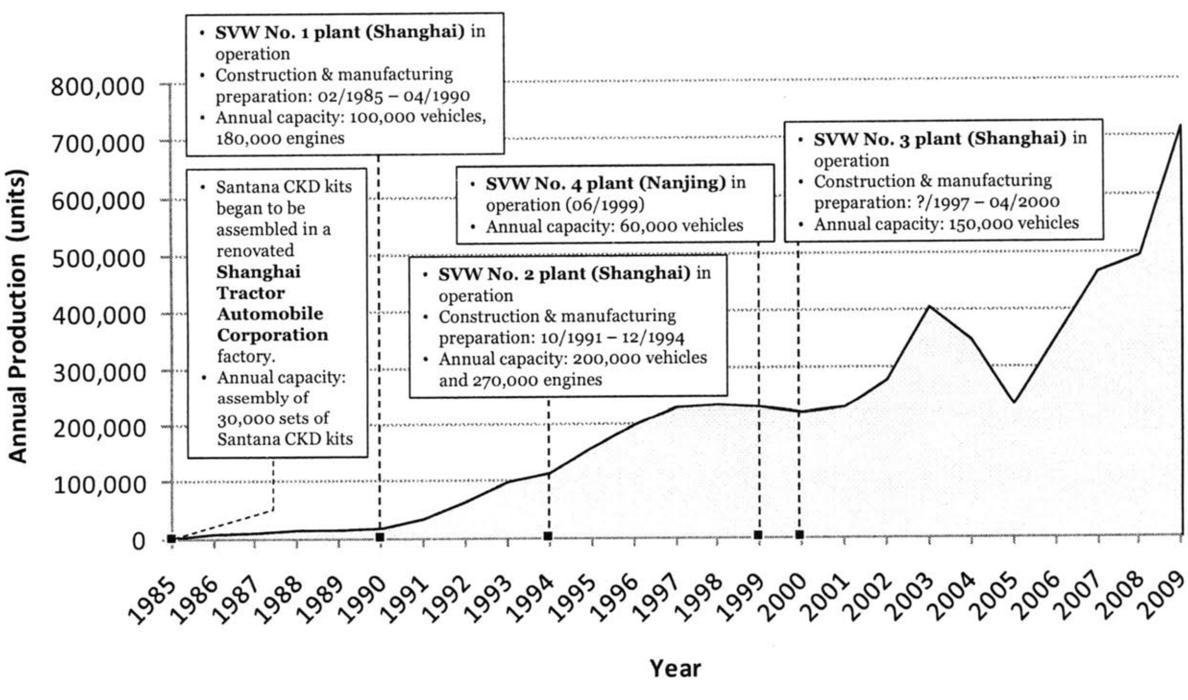


Figure 1-3: SVW's Production-Capacity Expansion, 1985-2009

Source: Created by author; Annual production data from Fourin (1998-2010); other information from SVW homepage (http://www.csvw.com) and firm interviews.

1994, when the Santana assembly line was completely transferred to the new plant with an annual production capacity of 100,000 vehicles and 180,000 engines (Figure 1-3). This growth was accompanied by SVW's active efforts at localization. By the end of 1994, SVW achieved a local-content ratio of 86% for the Santana model (for further details, see Section 4.3. below). With the higher local-content ratio, SVW's output capacity was less constrained by the internal foreign exchange reserves that could be mobilized to import CKD kits from Germany.

Rapid output growth was driven not only by increased capital efficiency (the introduction of modern manufacturing equipment and facilities) but also by improved labor productivity at the plant level (as a result of VW-initiated on-the-job training). In order to demonstrate an improvement in SVW's production capability, I use the trend of annual output volume per worker between 1990 and 1994 as a substitute for the plant-level learning curve of the same period, which I cannot draw due to a lack of data. Analysts may claim that the accumulation of labor's production skills and know-how was the main driver of the increase in the per capita output volume during the period because SVW produced only one vehicle model (Santana) and there was no further production capacity expansion until the end of 1994 (Figure 1-4; see also Figure 1-3). In other words, capital- and technology-related variables can be controlled during the period. SVW's annual output volume per worker increased dramatically from 6.1 units in 1990 through 12.8 units in 1992 to 17.0 units in 1994 (Figure 1-5). A large fraction of this increased efficiency resulted from the improved labor productivity, driven by knowledge transfer (through on-the-job training and technical assistance) and the mastery of the transferred know-how and skills through actual production practices.

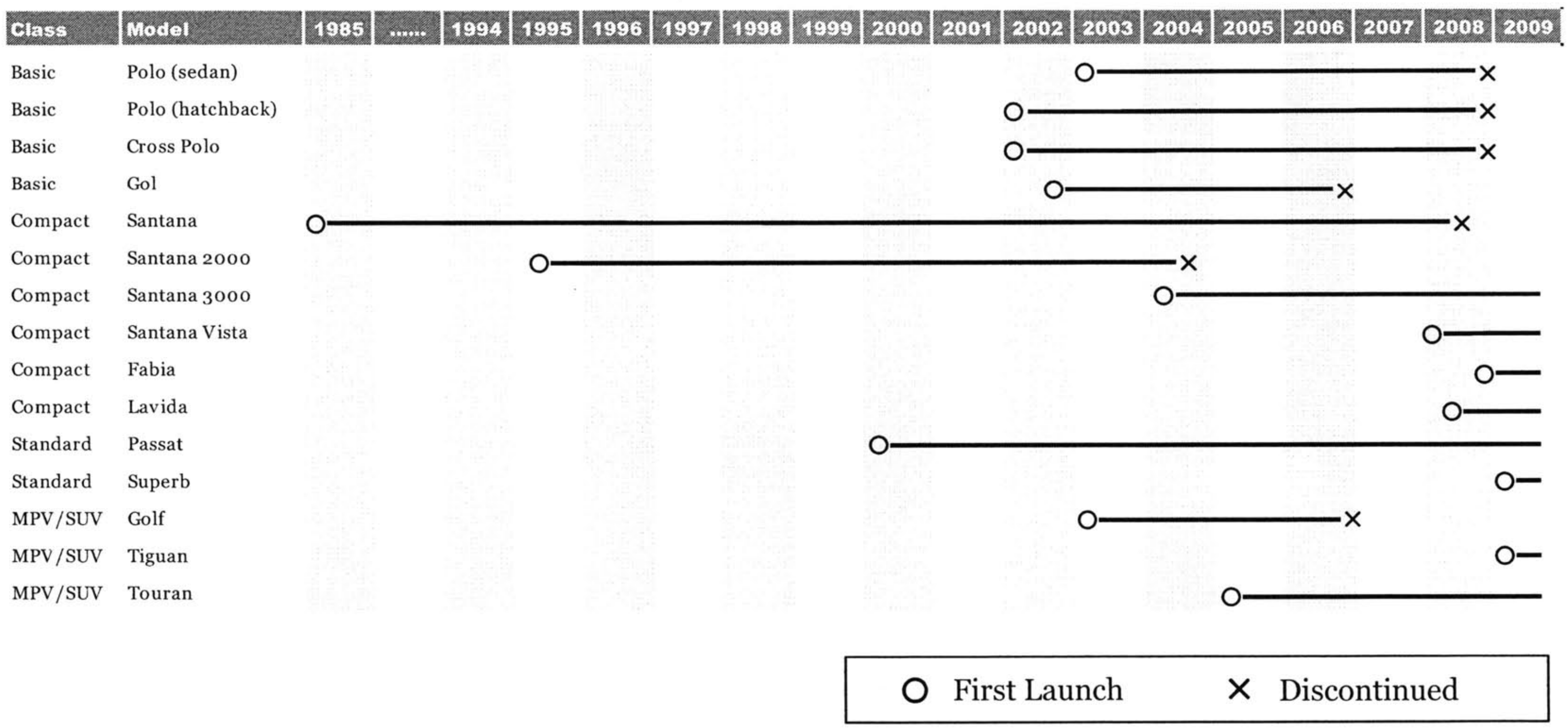


Figure 1-4: SVW's Passenger Vehicle Lineup, 1985-2009

Note: Minor model change schedules are ignored.
Source: Created by author from Fourin (2010) and CATARC (1986-2009).

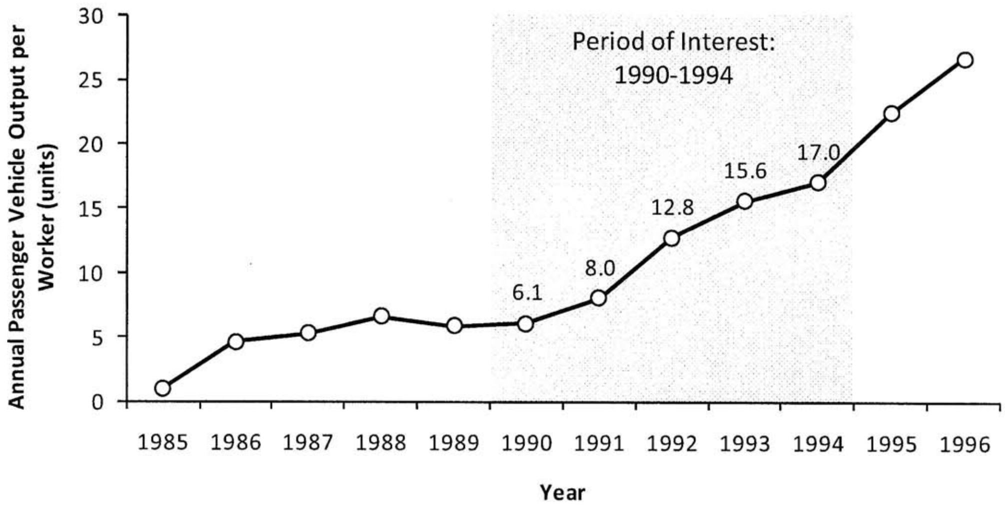


Figure 1-5: SVW's Annual Passenger Vehicle Output Volume per Worker, 1985-1996

Source: Computed from CATARC (1986-1997).

Despite the plant-level productivity increase, SAIC wanted more than what VW brought to SVW. One thing that SAIC demanded from VW was more advanced technologies than were currently being used, and their frequent updates. By 2000, SVW finished constructing the foundation of its current production bases: four manufacturing plants in Shanghai and Nanjing, with a total annual production capacity of over half a million vehicles (see Figure 1-3). Nonetheless, SVW produced only one vehicle model until it added Santana 2000, a minor-upgraded version of the original Santana, to its product lineup in 1995; SVW produced only these two models until 1999, when its regional rival, SGM, began its initial vehicle production (see Figure 1-4).

The original Santana was a four-door mid-size sedan (the second-generation Passat), which was sold in advanced markets between 1981 and 1989 (Edmonds, Inc., 2010). From SAIC's perspective, the dated Santana model needed to be replaced by newer vehicle models adopting more advanced technologies (Gallagher, 2006). VW, however, did not share this strong need because Santana was still selling well—in 1998, for example, SVW captured 46% of China's domestic market with Santana's two sister models—primarily due to SVW's oligopolistic market position.

Another issue obvious to SAIC was SVW's lacking in-house technology-development capability. When the Chinese government and SAIC signed the IJV project with VW, they expected that SVW would follow a sequential evolutionary path from a CKD kit assembler through an original equipment manufacturer (OEM) to an original design/brand producer equipped with independent in-house vehicle development capacity. But even a decade after its initial operation, SVW was no more than one of VW's multiple global auto-assembly bases lacking R&D capability. From VW's perspective, SAIC's desire to bring more in-house technical functions to SVW was not feasible in every sense. In the first place—even besides additional capital investment in development and testing equipment—SVW would have to hire a sizable number of German engineers for new vehicle development purposes, each of whom would demand over 100 times higher wages than an average local SVW worker received in the late 1980s (Posth, 2006). Although the exact number for SVW is not available, the estimate by the American Motors Corporation (AMC), the foreign equity holder of the Beijing-Jeep company, sheds light on how much SVW's comparable local R&D efforts would cost: in the mid-1980s AMC estimated that it would cost an additional US$200 million for local R&D and engineering activities alone, if it initiated a new vehicle development project in China, besides an additional capital cost of US$800 million for the modernization of manufacturing machinery and facilities and testing equipment (Mann, 1997). Equipping SVW with vehicle-development capabilities was not easily justifiable from a cost-effective perspective either, given that VW already had a number of vehicle models that could be immediately introduced to China's market.

Such a conflict of interests pushed SAIC to consider a new JV in partnership with GM in 1998. From SAIC's standpoint, the primary purpose of the deal was to create larger maneuvering space within the IJVs by inducing competition between VW and GM (Gallagher, 2006). As a latecomer to China's market, GM was active in its JV partnership with SAIC, the local market leader. GM promised to bring its up-to-date technologies to its JV and establish a sizable technical center in China. As promised, GM introduced contemporary Buick lineups to China through SGM, and established a sizable China-based technical center, the Pan Asia Technical Automotive Center (PATAC), in a separate JV partnership with SAIC. GM's active market-entry strategy effectively incentivized VW's strengthened local commitment. VW's response came rapidly; shortly after GM's arrival in Shanghai, SVW extended its product lineup, and introduced more advanced technologies, although the dated Santana model was still produced until 2008 (see Figure 1-4).

At present, SGM has four manufacturing plants in three locations: two in Shanghai, and one each in Yantai and Shenyang. The two Shanghai plants, which in combination have an annual production capacity of 320,000 vehicles and 200,000 engines, are the central production base for SGM (Figure 1-6). The Yantai and Shenyang plants were renovated from acquired production facilities, due to SGM's urgent need to expand production capacity before the completion of its second Shanghai plant. In contrast to SVW, SGM began its operations with modern manufacturing facilities, skipping the CKD assembly stage.[11] In accordance with the then-local-content regulation of 40% for the initial year of production, SGM's first Buick sedan sourced around half its final output value locally; SGM's Sail model, launched in 2001, even achieved a

[11] In China, imported parts and components are not considered CKD kits, if they are for a vehicle model, whose local-content ratio is over 40%.

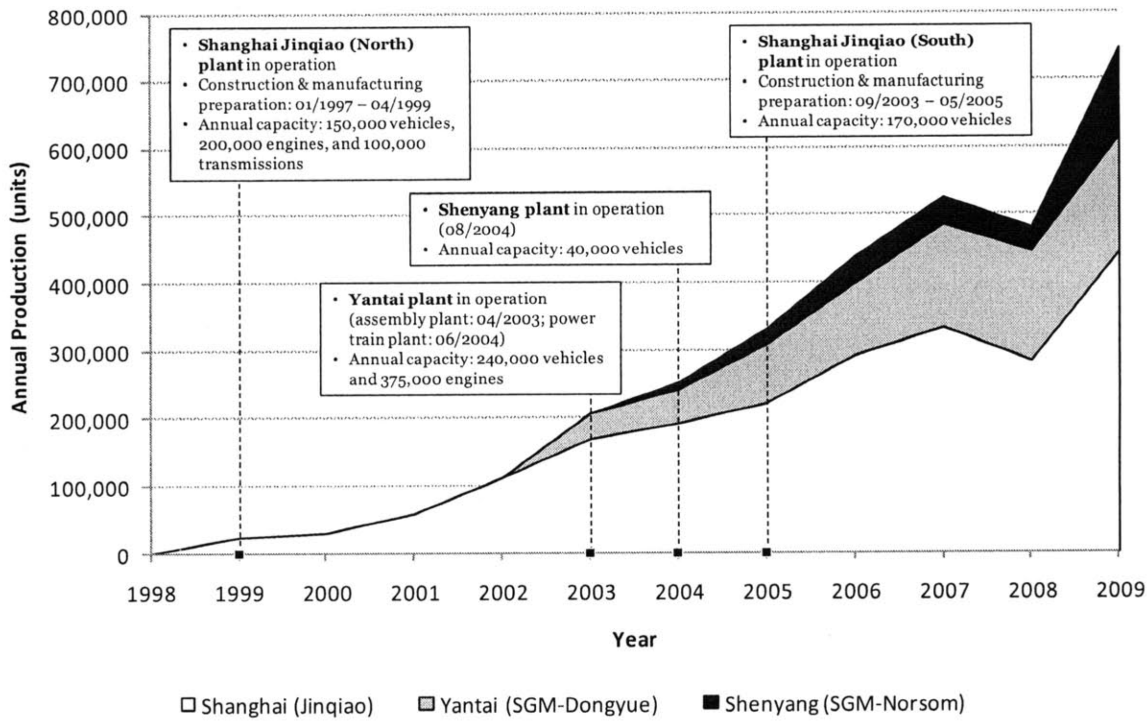


Figure 1-6: SGM's Major Production Capacity Expansion, 1998-2009

Source: Created by author; Annual production volume data from Fourin (1998-2010); other information from SGM homepage and firm interviews.

70% local-content ratio in the year of its market debut. SGM owed this outcome substantially to SVW's early localization efforts; the latecomer, with the mediation of SAIC, could share the first-mover's primary local supply partners (Tao, 2005).

As a second mover, SGM also benefited from the solid pool of semi-skilled labor in Shanghai. By the late 1990s, Shanghai already became the center of China's passenger vehicle manufacturing sector, thanks to SVW's enormous market success. The SVW-provided training program and first-hand manufacturing experience enriched Shanghai's local pool of semi-skilled labor with good knowledge of and experience in modern automotive manufacturing. When SGM began operations, a significant number of its production workers were ex-SVW employees, which in fact caused a substantial conflict between VW and SGM's two stakeholders—SAIC and GM (Tao, 2005). Of course, SGM had its own job training and technical assistance programs for its hires, but it clearly began the market race from a high starting point, on the foundation of pre-existing local infrastructure developed by the first mover.

Although sufficient information to draw SGM's plant level learning curve is not available, a rough guess of SGM's improved production capability can be made with the available output and employment data. As illustrated in Figure 1-6, SGM had only one

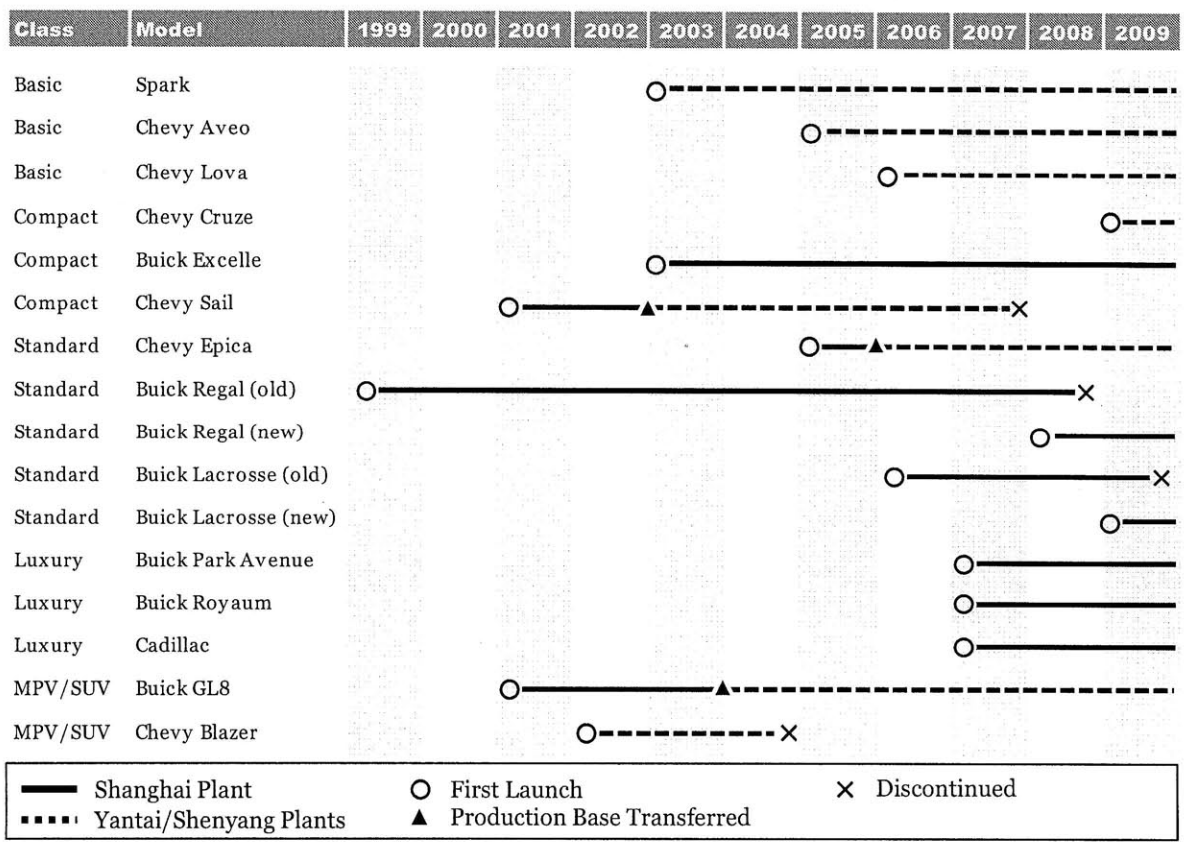


Figure 1-7: SGM's Passenger Vehicle Lineup, 1985-2009

Note: Minor model change schedules are ignored.
Source: Created by author; Data from Fourin (2010) and CATARC (2000-2008).

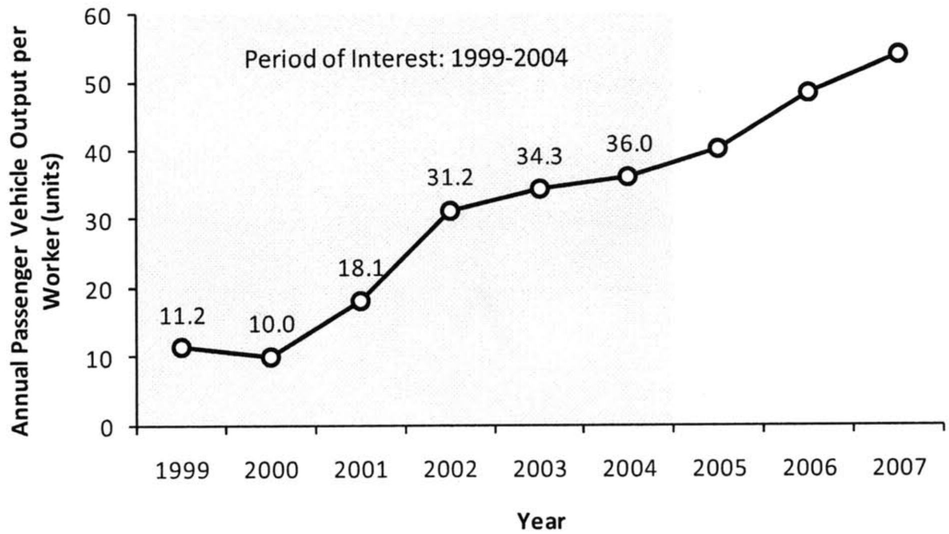


Figure 1-8: SGM's Annual Passenger Vehicle Output Volume per Worker, 1999-2007

Source: Created by author; Data from Fourin (2010) and CATARC (2000-2008).

manufacturing plant (Jinqiao North) in Shanghai until its Jinqiao South plant began operations in May 2005. Given that SGM's Jinqiao North plant had a production lineup of only one to three vehicle models between 1999 and 2004 (Figure 1-7), I attribute part of the changes in annual output volume per worker during the same period to changes in labor productivity, caused by internal training program and subsequent learning-by-doing practices. Except for the first year of the period, when SGM's employment increased by roughly 50% from 2,075 in 1999 to 3,011 in 2000, annual output volume per worker in SGM's Jinqiao North plant continuously increased by substantial margins, from 11.4 in 1999 through 31.2 in 2002 to 36.0 in 2004 (Figure 1-8). This fact in part shows that SGM engineers and production workers have accumulated skills and know-how necessary to utilize existing manufacturing facilities and equipment efficiently, and to optimize existing production technology.

In sum, the SVW and SGM case demonstrates that the two IJVs have developed in-house production capability on the basis of technologies and relevant technical support provided by VW and GM. The primary incentive for the technology transfer was to raise the plant-level productivity and product quality by helping the IJV workers take advantage of existing manufacturing facilities and equipment. With the foreign partner firms' technology transfer, both SVW and SGM currently produce export-quality products at competitive cost[12], and this gives rise to a critical improvement in local production capability.

4.2.3. IJVs and Project-execution Capability

Production capability, though crucial, is not sufficient to prepare local firms to be solid contenders in the global automotive industry. Local firms still need some other in-house capabilities. One of them is project-execution capability.

SAIC has accumulated certain degrees of project-execution capability from its JV partnerships with VW and GM. Until 2009, there were five major expansions in SVW and SGM's production capacity (excluding the case of acquisition-based capacity increases) and SAIC actively participated in each project (Table 1-2; see also Figures 1-3 and 1-6). The division of labor between SAIC and its foreign JV partners was clear in each expansion project. On the one hand, foreign JV partner firms were responsible for the overall assembly design and machinery procurement for each manufacturing plant. VW and GM provided their JVs with the assembly-line drawings and related technical assistance, and were in primary charge of procuring manufacturing equipment for the new plants. On the other hand, SAIC took charge of the construction management and engineering. The pre-investment feasibility assessment and the

[12] In 2006, SGM exported 3,350 units (SAIC, 2006), for example, and part of the SVW-produced volume has been exported to the Asia, Australia, and North America market since 2004 (Interview #4).

actual plant construction work for each project were carried out by the Shanghai Institute of Mechanical and Electrical Engineering (SIMEE), one of SAIC Group's wholly owned subsidiaries.[13]

Table 1-2: Expansion of SVW and SGM's Major Manufacturing Plants

	SVW Plants (Shanghai)			*SGM Plants (Shanghai)*	
	No. 1	*No. 2*	*No. 3*	*Jinqiao North*	*Jinqiao South*
Project scale (annual production capacity in thousand units)	Vehicles: 100 Engines: 180	Vehicles: 200 Engines: 270	Vehicles: 150	Vehicles: 150 Engines: 100 Transmissions: 200	Vehicles: 170
Project begun	February 1985	October 1991	December 1997	January 1997	September 2003
Project completed	April 1990	December 1994	April 2000	April 1999	May 2005
Assembly line design	VW	VW	VW	GM	GM
Procurement of production equipment	VW	VW	VW	GM	GM
Pre-investment feasibility study	SIMEE	SIMEE	SIMEE	SIMEE	SIMEE
Construction & production preparation	SIMEE	SIMEE	SIMEE	SIMEE	SIMEE

Source: Firm interviews and SVW and SGM's official websites.

This pattern of intra-JV division of labor seems natural in light of each party's comparative advantage. As SVW and SGM produce VW and GM's products, respectively, the former's manufacturing facilities necessarily need to reflect the latter's production technologies. The knowledge gap between the foreign and Chinese JV partners regarding the technologies restricted SAIC's involvement in some core tasks in each investment project such as designing assembly lines and procuring appropriate capital-goods providers. However, SAIC played a leading role in the actual construction phase. With half a century of manufacturing experience[14], SAIC was capable of managing and mobilizing internal and other local resources effectively so as to

[13] Interview #4.
[14] The precursor of the current SAIC Group was founded in 1958.

complete the projects on time and within budget.

From the plant-expansion projects, SAIC could improve part of its project-execution capability to a certain degree. SAIC had accumulated project-execution skills internally by involving SIMEE in SVW and SGM's major investment projects. An improvement in SAIC's project-execution capability is partly evidenced by the time SIMEE spent in completing each expansion project: obviously, the more SIMEE worked for SAIC's JVs, the sooner it completed its mission. When SIMEE undertook the construction and manufacturing preparation work for SVW's No. 1 plant, it took over five years to build the manufacturing facility to an annual production capacity of 100,000 vehicles and 180,000 engines (See Table 1-2). However, it spent only three years and two months completing its construction work for a bigger manufacturing plant with an annual production capacity of 200,000 vehicles and 270,000 engines (SVW No. 2 plant). The most recent SVW plant began operations in two years and five months from the onset of the project. Similarly, SGM's two main plants were completed in two years and three months (Jinqiao North) and in one year and nine months (Jinqiao South), respectively.

Of course, the project-execution capability that SAIC was able to improve from its IJV experience was partial at best given that SAIC did not have a chance to accumulate its skills and experience for basic and detailed project engineering tasks. SAIC's role has been marginal in such segments of the JV-related investment projects because they should reflect the JV-adopted foreign technologies. The situation is not likely to change, unless SAIC-affiliated JVs produce SAIC-developed passenger vehicles instead of VW and GM's vehicle lineups, a scenario that is highly unlikely.

4.2.4. IJVs and Innovation Capability

Like other Sino-foreign JVs, the two SAIC-affiliated IJVs have adopted VW and GM's technology under the official license contracts. Foreign automakers have ruled out JV-initiated new vehicle development, primarily due to its low financial feasibility. From an objective standpoint, the current OEM production model may be ideal for Sino-foreign assembly JVs, as it is cost-effective and time-saving. Accordingly, foreign automakers' other investment strategies have been formulated given this OEM production model. At present, basic R&D functions, necessary to develop new vehicles internally, are quasi-nil in most Sino-foreign JVs. Foreign automakers' non-manufacturing investment in their JVs has been limited to engineering support for the local adaptation of the imported technologies, such as slight modifications of vehicles' interiors to suit local tastes.[15] SVW is no exception to this trend.

SGM's case, however, somewhat deviates from the above explanation. Until now GM has invested in China-based engineering capability more actively than any other foreign automakers. PATAC is the showcase of GM's efforts at more comprehensive knowledge transfer. Since its founding in 1997, PATAC has been involved primarily in local adaptation of GM's passenger vehicle models (e.g., interior/exterior modifications) and vehicle safety testing. Literally, PATAC and SGM are two separate business entities, but they have developed strong business ties. Initially, around three-quarters of PATAC's business was done for SGM, and the share further increased to over 90% after SGM's development center was consolidated with PATAC's in 2003.[16] Recently, GM has expanded PATAC's scale and functional coverage substantially. The initial US$50 million JV now owns total capital assets worth US$300 million,

[15] Interviews #1, 3, 5, 6, 12, 16, 21, 23, 24, and 25.
[16] Interviews #2 and 3.

and its employment level increased four-fold from 400 in 2002 to 1,600 in 2009 (Li, 2009). With its rapid external growth, PATAC has redefined its primary missions: as of 2009 PATAC engineers were also carrying out part of the concept car and platform development projects for SGM's future passenger vehicle lineups. In 2008, GM officially announced that it would equip PATAC with independent in-house vehicle development capabilities by 2010 (*ibid.*)[17], although this plan is being met with skepticism because the U.S. government has prohibited the public loan made to rescue GM from bankruptcy from being spent on the firm's global business expansion (Bradsher, 2009a).

In the case of SGM, there is evidence that its foreign equity holder will substantially expand China-based vehicle development and engineering activities beyond modest technology adaptation works. SAIC's experience with SGM and PATAC might have been an asset, to a certain extent, when it launched its first self-branded passenger vehicle in 2005. But this point should not be exaggerated given that PATAC—SGM's engineering arm—still has only limited technological capacity by global standards, with emphasis on minor vehicle modifications and safety testing. Also, SGM's case is an exception rather than a typical example. Other foreign firms have made far less investment in local technology development activities than GM.[18] There is little evidence that the Sino-foreign JV practice has significantly upgraded local JV partner firms' innovation capabilities. Foreign firms in the first place have not carried out critical basic R&D activities or new product development projects in China.

One factor we should not overlook in the SAIC-GM alliance case is the sequence of the events that occurred between PATAC's functional expansion and SAIC's improved in-house

[17] Also confirmed with Interview #2.
[18] See Table 2-3 in Chapter 2.

vehicle development capability. When GM decided to strengthen its joint R&D activities with SAIC through PATAC in 2008, SAIC already possessed substantial in-house vehicle development capability based on technologies and human resources acquired from Rover, as evidenced by the market launch of Roewe 750—the first of SAIC's own brand models—in 2007.[19] In other words, in terms of the direction of causality, it is more likely that GM came closer to SAIC because SAIC had better innovation capability, rather than that SAIC developed better innovation capability because GM came closer to SAIC. In addition, GM's special circumstance may have also affected its China strategy. GM's HQ in Detroit may be interested in transferring an increasing portion of its R&D function to PATAC because GM's recent financial trouble could reduce GM HQ's ability to develop new vehicles targeting emerging markets in a timely manner. With this strategy, GM aims to employ PATAC as its regional R&D hub, which would mitigate GM HQ's R&D burden on the Asian market.[20] Another signal showing that GM has begun to look at SAIC as a critical strategic partner is GM's recent decision to establish a new 50-50 automotive assembly JV in India, in alliance with SAIC (Bradsher, 2009b).

In sum, even the best practice of the Sino-foreign JV arrangement does not weaken the argument that foreign automakers' investment in local R&D is a function of the pre-existing local innovation capability, rather than the other way around. Until now, the dominant Sino-foreign JV business model—a quasi-OEM production system where the IJVs manufacture foreign-licensed vehicle models in accordance with the drawings and specifications provided by leading global automakers—has failed to make critical contributions to local innovation-capability building. The IJV model by nature does not need local engineering capability beyond a minor local adaptation

[19] Outward FDI's contribution to SAIC's in-house technology development will be discussed in detail in Chapter 2.
[20] Interview #2.

of imported technologies, and Sino-foreign JVs, by and large, have remained assembly-specialized operations, lacking the abilities and means to nurture local innovation capability.

4.2.5. Knowledge Flows from IJVs to Wholly SAIC-controlled Subsidiaries

As argued in the previous sections, Sino-foreign JVs have substantially improved their in-house technological capabilities through technological transfer from foreign JV partner firms and following-up learning-by-doing practices, although the improvement is less obvious in project-execution and innovation capabilities than in production capability. Then, the next question is how local JV partner firms can benefit themselves from the Sino-foreign JVs' improved technological capabilities in the absence of official knowledge flow channels between Sino-foreign JVs and local JV partner firms. As explained in Section 4.2.1., Sino-foreign JV's in-house technological capabilities are their own assets, which cannot be utilized for local firms' self-benefits without the consent of their foreign JV partner firms. The official channel through which the IJVs' in-house technological capabilities can be transferred to local JV partner firms' wholly owned subsidiaries does not exist under the current Sino-foreign JV arrangement.

SAIC released such constraints on horizontal knowledge flows primarily through the acquisition of ex-JV employees. Since 2006, SAIC has operated a wholly owned vehicle development division, called SAIC Motor. The flagship SAIC subsidiary, taking initiatives in the group's self-brand vehicle development, is staffed by SAIC's best R&D and engineering personnel, and has already carried out several independent vehicle development projects (e.g., Roewe 750) successfully.[21] A substantial number of SAIC Motor's key engineers have working experience with SVW, SGM, and PATAC. In many cases, they were scouted by SAIC with more

[21] Interview #5.

attractive financial packages than they received at the SAIC-affiliated IJVs.

A SAIC Motor engineer whom I interviewed is an example of such practices. The ex-PATAC hire voluntarily left his former company to work for SAIC Motor. He was very satisfied with his current job because not only is he paid more by his current employer but he is also involved in more creative and productive activities.[22] This hiring practice is not limited to skilled engineers. A SAIC manager confirmed that a considerable number of ex-SVW and SGM shop floor production workers were working for SAIC Motor, as well.[23] With such hiring practices, SAIC has spread its JV-based learning internally to its wholly controlled subsidiaries.

In addition, SAIC has internally accumulated improvements in project-execution capability, through a series of production-capacity expansion projects for its IJVs. SIMEE's improved project-execution capability was a precious asset when the SAIC Group independently undertook the assembly line and engine manufacturing plant construction project for SAIC Motor, with the substantial assistance of Ricardo 2010—a then-British automotive consultancy, which later became SAIC's subsidiary.

I note, however, that inter-firm variations exist in terms of the degree of benefit from IJV-based learning. For example, the First Automotive Works (FAW) and the Dongfeng Motor Corporation (DFM), which are strong rivals of SAIC in the local market, have been less successful than SAIC in using IJV-trained human resources, in part due to their rigid wage system.[24] China's socialist traditions still remain relatively entrenched in these two centrally controlled state-owned enterprises (SOEs)[25]. Their compensation system, based on jobs and

[22] Interviews #5 and 20.
[23] Interview #19.
[24] Interview #23.
[25] Both FAW and DFM are under the direct control of China's central government.

seniority, allows far lower thresholds for wage differentials than SAIC's does.[26] Their rigid wage system has substantially limited both FAW and DFM's ability to attract local talent, while SAIC, a locally controlled SOE[27] located in Shanghai, which has a more open and capitalist atmosphere than most other Chinese cities, seems to be relatively free from the socialist legacy.

4.3. Sino-foreign JVs and Vertical Knowledge Flows

Automobile manufacturing is a composite art that deals with over 20,000 parts (Womack *et al.*, 1991). Accordingly, local assembly and supply capabilities are inter-dependent; quality vehicles are built on quality parts and components. Recently, their inter-dependency has been higher than in the past. Parts suppliers' technological capability is viewed as an increasingly crucial constituent of vehicle assemblers' technological competency, as their R&D and engineering collaboration has been extended to very early stages of new vehicle development (Fujimoto, 2007; Jurgens, 2001). Taking up this point, in this section, I examine how Sino-foreign assembly JVs have contributed to the technological development of China's local supply sector.

4.3.1. The Early Construction Stage of the Local Automotive Supply Base

When early Sino-foreign assembly JVs entered into actual vehicle production, extremely weak local-supply capability was a serious obstacle (Posth, 2006). Most local parts suppliers lacked the production capabilities to meet MNC-set quality standards; thus, early assembly IJVs in China began their local production through the assembly of imported CKD kits. The Chinese central government granted the IJVs their initial operations based on the CKD kit assembly, but required

[26] Interview #23.
[27] The SAIC Group is an SOE under the direct control of the Shanghai municipal government.

them to maintain certain time schedules for localization. Public measures like import tariffs, local-content regulation, and foreign exchange control were used to incentivize the IJVs' localization activities. Also, failure to abide by such guidelines from Beijing meant the withdrawal of various preferential policies (e.g., subsidized credits) for the IJVs. A primary reason for China's strong localization drive is that imported CKD kits exhausted the then-limited national foreign exchange reserves and the simple assembly of the foreign-made kits was far from desirable in building the local automotive sector (SDPC, 1994).

With local currency's limited convertibility to hard currency, foreign JV partners also saw an imminent need to boost local sourcing (Harwit, 1995; Mann, 1997; Posth, 2006). Although they could earn large profits by selling CKD kits to their JVs, this CKD business model was not sustainable due to the limited foreign exchange reserves. Under the then-Chinese foreign-exchange regime, Sino-foreign JVs could raise hard currency necessary to import CKD kits only by exporting their final products. Export, however, was not immediately possible, as domestically-assembled vehicles were too expensive given the quality by global standards, due to the small production scale, low labor productivity, and lack of production skills. Accordingly, all of the IJV-produced vehicles were supposed to be sold locally. Sino-foreign JVs needed to raise their output volume to drive cost down and accumulate local production skills, but their production scale was constrained by the amount of foreign exchange reserves that could be used to import CKD kits. This is the dilemma in the CKD business model: the local ability to export depends on the local ability to import CKD kits, but, conversely, this local ability is constrained by the amount of foreign exchange reserves determined by the ability to export. Expanding local sourcing was considered as the most realistic solution to this dilemma.

However, substantial inter-firm variations existed in localization outcomes, partly due to dissimilar local capacity to deal with the coordination problem, which was obvious in the early stages of China's automotive sector development (Harwit, 1995; Thun, 2006). When SVW—the most successful localizer among early Sino-foreign JVs (Figure 1-9)—initiated its localization efforts, VW's technical staff could not find a single local parts supplier near Shanghai that met the global company's minimum quality standards (Posth, 2006). VW was willing to help local parts suppliers improve their product quality, but it was evident that VW's technical assistance would be in vain unless the supply firms upgraded their dated production equipment and facilities. VW thus requested that they make additional investment in manufacturing facilities, as a prerequisite to accessing its technical assistance. Local supply firms were, however, reluctant to

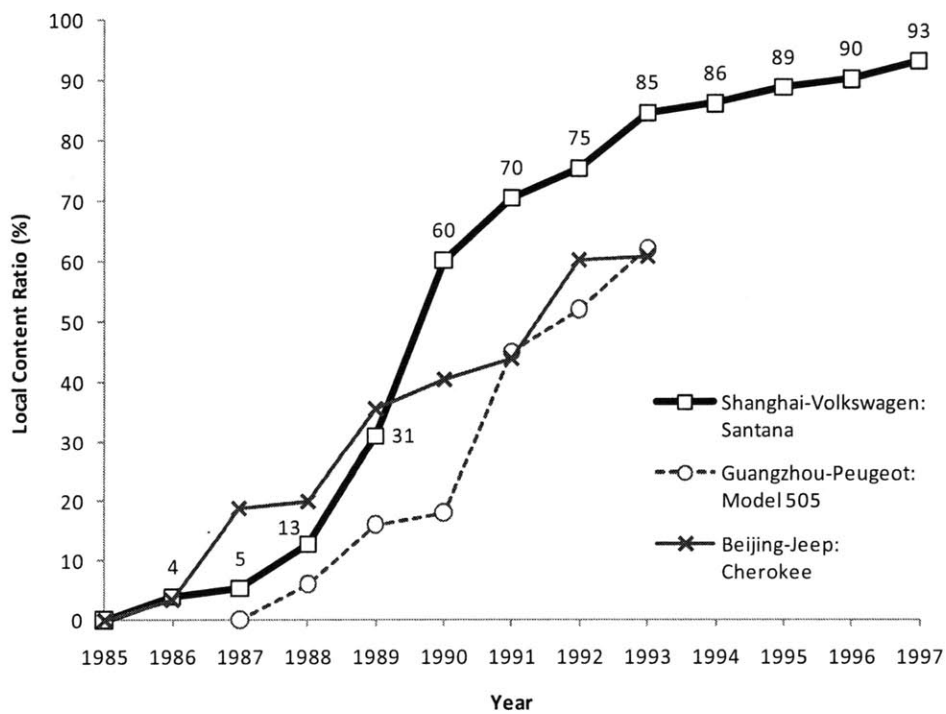


Figure 1-9: Localization Paths of Three Early Sino-foreign JVs, 1985-1997

Note: In 1997, Peugeot liquidated its stake in Guangzhou-Peugeot, and Honda took over the stake to establish a new joint venture with Guangzhou Automotive Group (Guangzhou-Honda).

Source: Data from Harwit (1995) and Huang and Thun (2002).

take the financial risk attached to their capital investment unless they were guaranteed solid supply contracts with SVW (Huang and Thun, 2002). Unfortunately, such contracts were not immediately possible given SVW's limited operation scale and local supply firms' weak capability during its early operation periods.[28]

The Shanghai municipal government played a critical role in breaking through the standstill. It established the Localization Office under the direct supervision of the Mayor's Office in order to monitor and support the localization drive of the Shanghai automotive industry. Funds for localization activities, controlled by the Localization Office, were raised through a localization tax, which was set at around 16% of a Santana's retail price (Huang and Thun, 2002). Local-supply firms could substantially reduce investment-involved financial risks through their access to loans subsidized by the localization fund. As coordination failure became less obvious, VW became more engaged in SVW's localization project (Long, 1996; Posth, 2006). When local-supply firms upgraded their production facilities, SVW hired retired engineers from the German Senior Expert Service as short-term consultants. Those engineers were in primary charge of training SVW assembly workers and engineers, and providing local-parts suppliers with technical supports on the operation of new production equipment and facilities (Posth, 2006). As a result, the number of SVW's local-parts suppliers that could meet VW's quality standards (under most circumstances) increased from 31 in 1990 to 230 in 1997 (Thun, 2006).

The Sino-foreign JV arrangement, as exemplified by the SVW case, generated industry-wide vertical knowledge spillovers, when it was implemented in combination with an effective public support and incentive system. SVW was the main window through which local-parts suppliers could access VW' advanced production technology and know-how. In particular, VW's

[28] In late 1985, SVW assembled about 30 cars per day (Huang and Thun, 2002).

technical assistance, which aimed at a more complete transfer of production knowledge and skills, helped local parts suppliers utilize their modern production equipment in order to raise their product quality. Supply contracts with SVW let them further accumulate learning through their self-application practices (Huang and Thun, 2002).

Most other early assembly IJVs in China were not as active in localization as SVW was. For example, over 70% of Beijing-Jeep's local content in 1997 was actually sourced from the outside of its main assembly base in Beijing (mostly from Shanghai)[29], suggesting that the IJV simply took advantage of existing supply infrastructure rather than making efforts to build its own. This is a striking contrast to the fact that 90% of SVW's local content was procured within Shanghai (Huang and Thun, 2002). This fact, however, does not mean that the IJV arrangement itself is not effective for the purpose of localization; instead, it is more a matter of implementation. The SVW case shows that the best practice of the IJV arrangement can ensure a successful localization outcome.

4.3.2. Localization in More Liberalized Environment

Public IS tactics, such as local-content regulation, import tariffs, and foreign-exchange control, gave substantial incentives to the localization drive in China's automotive sector, as argued in the previous section. Such protectionist measures, however, were mainly incapacitated with China's accession to the WTO. In accordance with the conditions of its WTO membership, for example, China repealed its local-content regulation in 2001, and reduced tariff rates for imported vehicle and automotive parts by 2006 to roughly one-third of the year 2001 levels (Harwit, 2001). Accordingly, foreign automakers gained more options for formulating their sourcing strategies.

[29] Even in 2002, Beijing-Jeep sourced over half the total vehicle value of its Cherokee lineup from Shanghai (Thun, 2006).

The changed economic environment, however, has not significantly interrupted the localization drive in China's auto sector. Foreign automakers have still taken a pro-localization position in the post-WTO period. The primary reason seems to be the heated competition and increasing cost-reduction pressure in the Chinese market. China's local demand for passenger cars has grown at phenomenal rates for the last several years. The annual domestic sales of passenger cars in China were barely over half a million units in 1997 (around 3.3% of the then-US market size), but grew nearly 20 times, to over 10 million units by 2009, roughly the same size as the US market for the same year (Figure 1-10).[30] Such impressive market growth has attracted more automakers to China, as evidenced by the number of China-based passenger car makers, which increased from 11 in 1998 to 64 in 2009.[31] Under the changed market condition

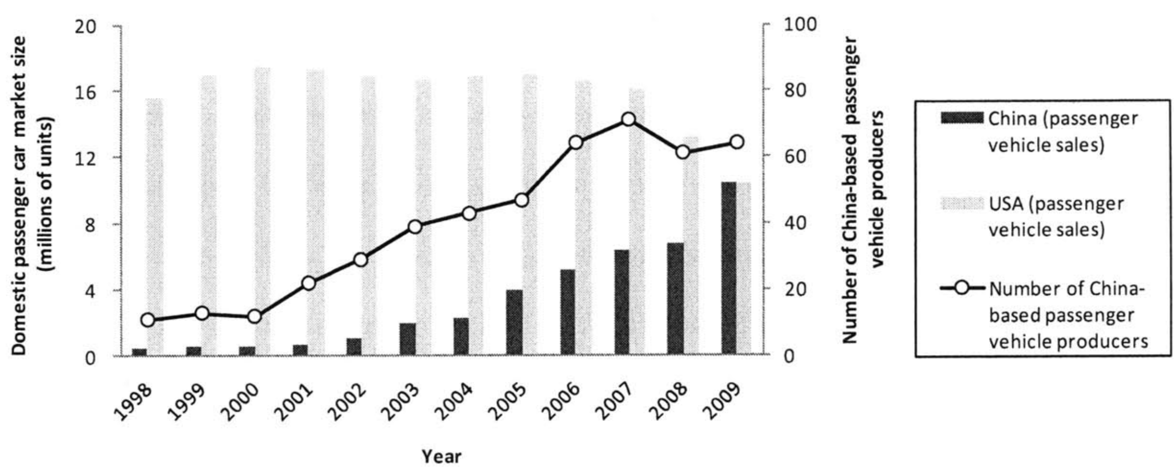


Figure 1-10: Number of China-based Passenger Vehicle Producers and China's Passenger Vehicle Market Size (in comparison with USA's), 1998-2009

Source: China data from Fourin (1998-2010); USA data from Ward's Automotive Group (2010).

[30] As of 2009, the United States and China were the only countries that had annual domestic passenger car markets of over 10 million units.

[31] Since 2004, China's central government has controlled market entry to the domestic passenger vehicle sector by requiring newcomers to have a total investment of RMB two billion and an R&D investment of RMB half a billion as preconditions. Accordingly, the total number of domestic passenger vehicle producers has remained stable for the last several years.

Table 1-3: Retail Prices of Selected Passenger-vehicle Models Sold in China, 2003 and 2007

				Retail Price (thousands of RMB)		
Class	*Producer*	*Brand*	*Model*	*2003*	*2007*	*% Change*
Full-size	SVW	Volkswagen	Passat 1.8 L*	280	233	-16.8
	SGM	Buick	Regal 3.0 L	369	285	-22.8
	SGM	Buick	Regal 2.5 L	263	196	-25.5
	SGM	Buick	Regal 2.0 L	237	176	-25.7
Small/	FAW-VW	Volkswagen	Bora 1.8 L	204	173	-15.2
Medium	SVW	Volkswagen	Santana 1.8 L	99	90	-9.1
	DF-PSA	Citroën	Elysee	140	106	-24.3
	DF-Nissan	Nissan	Sunny	190	167	-12.1

Note: * Passat 1.8 L Turbo high-end (luxury) trim.
Source: 2003 data from Farhoomand and Tao (2005); 2007 data from Fourin (2007).

(from a supplier market to a consumer market), local automakers have given up their high-price policy. Between 2004 and 2007, for example, Sino-foreign JVs, affiliated with the Chinese Big Three automotive groups, reduced the retail prices for their flagship vehicle models between 12% and 26% (Table 1-3).

Table 1-4 illustrates the fact that increased market competition is a primary factor that has lifted the cost-reduction pressure. As shown in the table, SVW constantly reduced the retail price of its best-selling model Santana from RMB114,000 in 1998 to RMB79,800 in 2007. During this period, the reduced tariff rate itself was not chiefly responsible for the price-cut, because SVW already achieved a domestic-content ratio of 93% for Santana by 1998 and thus should not have been affected much by the changed tariff rates. Instead, the changed market conditions, such as the transition away from the oligopolistic market—which is evidenced by SVW's declining market share (from 46% in 1998 to 9% in 2007) despite its continued market-leading status and weakened market protection against foreign imports (e.g., reduced tariff rates)—should be seen as a main driver that caused automakers' changed pricing policy. In fact, until leading global automakers rushed into the Chinese market in the late 1990s, neither local auto assemblers nor parts suppliers had incentives to reduce their production costs, as the oligopolistic market condition in China's passenger-car sector allowed them to enjoy excess profits without doing so (Farhoomand and Tao, 2005). The new market environment, however, does not ensure Sino-foreign JVs excess profits any more, and they must lower the cost to win the competition-driven price war.

Table 1-4: Cost-reduction Pressure from Increased Market Competition, SVW's Santana

Indicators	*1998*	*2003*	*2005*	*2007*
Facts on SVW's Santana				
Retail price (thousands of RMB)	114†	99††	90††	80††
Local-content ratio (%)	93†	99‡	99	99‡‡
SVW's market performance				
Market share in China (%)§	46	20	8	9
Market share relative to market leader's (market leader's share = 100)	100	100	77	96
Domestic sales rank§	1	1	2	3
Tariff rates by local-content ratio (%)				
Integrated vehicle imports	110*	52	34	25**
Local-content ratio < 40%	50*	52	34	25**
40% ≤ Local-content ratio < 60%	30*	21	14	10**
60% ≤ Local-content ratio < 80%	24*	21	14	10**
Local-content ratio ≥ 80%	20*	21	14	10**

Note: (i) The tariff rates for 2003 and 2005 were computed by the author under the assumption that the 2001 tariff rates of 70% for integrated vehicles and 28% for parts and components declined linearly to the 2006 levels of 25% and 10%, respectively; (ii) Santana's local-content ratio for 2005 was surmised from those for 2003 and 2007; (iii) † Data for 1997; (iv) ** The tariff rates required to China as conditionality of WTO accession.

Source: † Huang and Thun (2002); †† Shu (2009b); ‡ Thun (2006); ‡‡ Fourin (2007); § Computed from Fourin (2010); * Farhoomand and Tao (2005); ** Harwit (2001).

With the increased market competition, China's post-WTO actions have not interrupted its localization drive. Despite the lowered market protection against imported parts and components, China-based automakers are still incentivized to expand local sourcing for production-cost reduction. According to a 2004 survey by the Korea Institute for Industrial Economics and Trade, parts and components produced in China were 39% cheaper than those produced in Japan in terms of retail price and 28% less in terms of production cost, although the former did not reach the latter's product quality (Table 1-5). Similarly, parts and components produced in China were substantially cheaper than those produced in Korea, which present a benchmark price-quality substitution level for parts and components, although their price/cost index margins were narrower than their quality index gaps. This fact suggests that Sino-foreign IJVs can reduce production costs significantly by increasing domestic content, although they may need to compromise product quality somewhat. According to a GM-China engineer, parts and components sourced within China are not only reasonable in price but also good enough in quality to ensure Chinese consumers SGM's quality-products; parts and components sourced from outside of China are, in general, over-engineered by Chinese standards and would drive up production cost without adding clear benefit.[32]

Table 1-5: Price and Quality Indices for Automotive Parts and Components Made in China, in Comparison with Those Made in Japan and Korea, as of 2004

Price and Quality Indices	*Automotive Parts and Components*	
(※ Parts and Components Made in Japan = 100)	*Made in China*	*Made in Korea*
Price indices*		
Retail price	61	84
Production cost	72	84
Quality indices**		
Defection rates	82	94
Durability	75	93
Precision and Accuracy	74	91

Note: * Higher numbers mean higher prices or costs; ** Higher numbers mean higher product quality.
Source: Adapted from Cho *et al.* (2007).

[32] Interview #2.

In addition, even the post-WTO tariff rates are effective enough to support China's import substitution drive in the automotive parts sector. The basic framework of China's post-WTO tariff policy for the automotive sector is that (i) different rates apply to integrated vehicles (25%) and parts and components (10%), and (ii) even vehicles assembled in China are considered integrated-vehicle imports and thus are subject to the tariff rate of 25%, if their local content is 40% or less.[33] Under the heated market competition, the tariff rate difference of 15% has in part

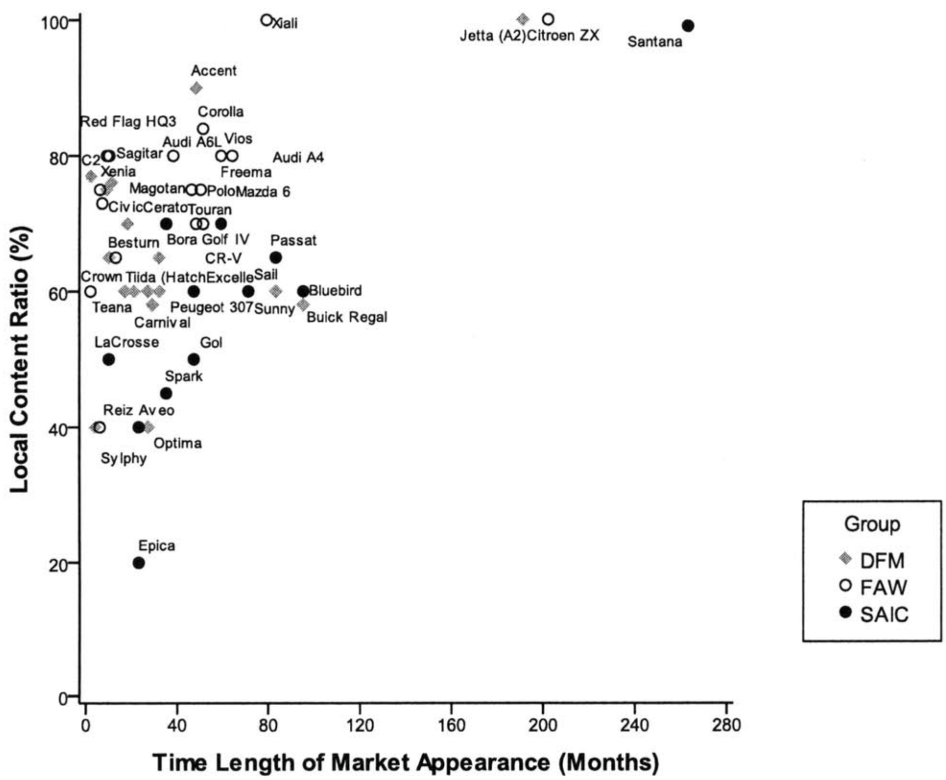


Figure 1-11: Local-Content Ratio by Firm and Vehicle Model, As of 2008

Source: Data from Wang (2009), Fourin (2007), and firm interviews.

[33] In April 2006, the United States, the European Union, and Canada, seeing this policy as a serious obstacle to their automotive parts export to China, brought this issue to the WTO for a dispute settlement. On February 11, 2009, the WTO concluded that the policy went against the conditions for China's WTO accession, and on February 27, the Chinese government accepted the WTO's ruling with a grace period of 7 months and 20 days for the policy's repeal (WTO, 2009).

encouraged IJVs to expand their local sourcing, as evidenced by the fact that, as of 2008, most top-selling passenger models produced by major Sino-foreign JVs showed fairly high local-content ratios, with little inter-firm variation (Figure 1-11). As of 2008, each firm's steady-selling, flagship models, such as Santana, Jetta, and Citroën ZX comprised nearly 100% of the parts and components produced within China, and most of the vehicle models, which showed a 40-month or longer period of market presence, achieved local-content ratios of 60% or higher.

4.3.3. Upgrading Stages: The Inside of the Local-Content Ratio

I urge caution in translating high local-content ratios directly into local suppliers' improved technological capabilities. In the first place, firm-level local-content figures are believed to be biased upward because automotive parts and components, which are initially imported by a domestic party and then traded to other local firms (likely, an assembler), are often counted as local content for the latter.[34] More critical than the bias issue, however, is the fact that a high local-content ratio does not ensure China's local suppliers an increasing role in local production networks. Note that China does not regulate foreign equity ownership in its automotive-parts sector; thus, foreign automotive-parts suppliers are allowed to establish their wholly controlled subsidiaries in China and to acquire controls over local assets without upper thresholds (Tsuji and Wu, 2005). In the absence of equity-related regulations, leading global parts suppliers have established Chinese branches under their full control, in proximity to their major customers. In the post-WTO period, it was not rare, either, for foreign automakers, when they established new IJV operations in China, to enter the Chinese market together with their primary home-base-supply partners. As a result, local automotive production clusters, which emulate MNCs' home-

[34] Interviews #16 and 23.

based production networks, have been formed around major Sino-foreign passenger vehicle assembly JVs.[35]

In many cases, Chinese local parts producers participate in MNCs' localized automotive production networks as low-tier supply partners.[36] This outcome is in part related to the paradigm shift in the modern automotive manufacturing business itself (from Fordism to Toyotism), in addition to Chinese supply firms' insufficient technological capabilities. Before the Japanese lean production system was introduced to Western automakers, a provided-drawing system for detail-controlled parts was the industry's standard sourcing method (Clark and Fujimoto, 1991). The provided-drawing method refers to the sourcing pattern where assemblers design automotive parts and components and provide their drawings and specifications to parts makers for their actual production. Even in the early 1990s, when global leading automakers were increasingly incorporating the lean production system into their Fordist mass-production model, the provided-drawing sourcing model was still prevalent in the West (Fujimoto, 1999). In this sourcing model, parts suppliers do not necessarily need to equip their own in-house R&D capabilities; their primary competitive advantage instead is in their production capability, which enables the production of quality parts and components at competitively low costs, in accordance with the assembler-provided designs for each part. In this model, the assembler-supplier relationship is more price-driven, and often lasts a short period of time.

At present, however, the approved- (or consigned-) drawing method is more prevalent (Fujimoto, 2007). In this sourcing method, supply firms design and develop parts and components for themselves, in accordance with assemblers' integrated-vehicle designs. Once

[35] This tendency is more obvious in the case of Asian automakers. Refer to Fujiwara (2006), Kishimoto (2006), and Jung and Lee (2007) for Japanese and Korean automotive supply networks in China.
[36] Interviews #2, 9, 16, 17, and 23.

assemblers approve the designs and specifications, suppliers manufacture parts and components to deliver them to assemblers. As this method becomes the industry's standard sourcing model, there has been a critical change in the assembler-supplier relationship: assemblers and their primary parts suppliers work together from the very early stages of new vehicle development (i.e., design-in) and form more interdependent and longer alliances than before (Fujimoto, 1999). Accordingly, their collaboration process has generated crucial knowledge-sharing networks for technology development.[37]

It is technologically challenging to be top-tier supply partners of global leading automakers. In order to deliver quality black-box parts and components to assemblers, parts producers need highly competitive R&D and engineering capabilities. In addition to competitive manufacturing capability, they should be able to design key parts for themselves in accordance with integrated vehicle designs, and to integrate part-specific technologies for more complicated subassembly or module components. When parts suppliers are classified into component manufacturer, subassembly manufacturer, and module-system manufacturer, only module-system manufacturers and a small number of subassembly manufacturers are qualified as leading automakers' primary suppliers (Veloso *et al.*, 2000).

The technological barrier is even higher for newcomers. The knowledge-sharing networks between assemblers and parts suppliers discriminate against outsiders, as the networks are formed through long-term transactions on the basis of social, cultural, and geographical proximity. Outsiders can join the networks, but only after proving that they have better engineering and manufacturing capabilities than insiders do, as assemblers often set higher

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[37] For example, the number of patents that Toyota and Honda obtained jointly with their primary-parts suppliers increased substantially from 900 and 290 in 2000 to 1,480 and 480 in 2004, respectively (Konno, 2006).

technological standards for newcomers than for those already having joint engineering experience with them (Veloso and Kumar, 2002). Also, it is not rare for assemblers to ask newcomers for a significant commitment to their development capabilities without guaranteeing any supply contracts (*ibid.*). Thus, it is hard and costly for outsiders to replace pre-existing primary suppliers. From the assemblers' perspectives, there is no strong incentive to change existing members of their knowledge-sharing community, in the face of substantial transactions and adaptation costs, unless newcomers can offer benefits that can more than offset these costs.

With a "China-rush" of leading global supply firms, the Chinese local automotive production system has embraced more multinational actors. Sino-foreign assembly JVs are at the center of the local automotive production system in most of the Chinese major automotive clusters—notably, Shanghai, Changchun, Wuhan, Guangzhou, and Beijing (Figure 1-12). Foreign automakers usually exercise their equity share in the IJVs through their wholly owned subsidiary holding companies in China.[38] Although China-based holding companies are the direct parties that are involved in the management of the assembly JVs, they themselves do not have strong influence in determining key JV matters. Instead, most foreign-side key decisions, including what to produce in China and from whom to source key parts and components, are made in the MNCs' HQ, and are conveyed directly to their Chinese operations.[39] Some foreign automakers operate separate JVs for power train components (mainly engines and transmissions) with their local assembly JV partners, and they are managed the same way that the assembly JVs are.

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[38] For example, GM controls its equity in SGM through GM-China, and VW controls its equity in SVW and FAW-VW through VW-China.
[39] Interviews #2 and 12.

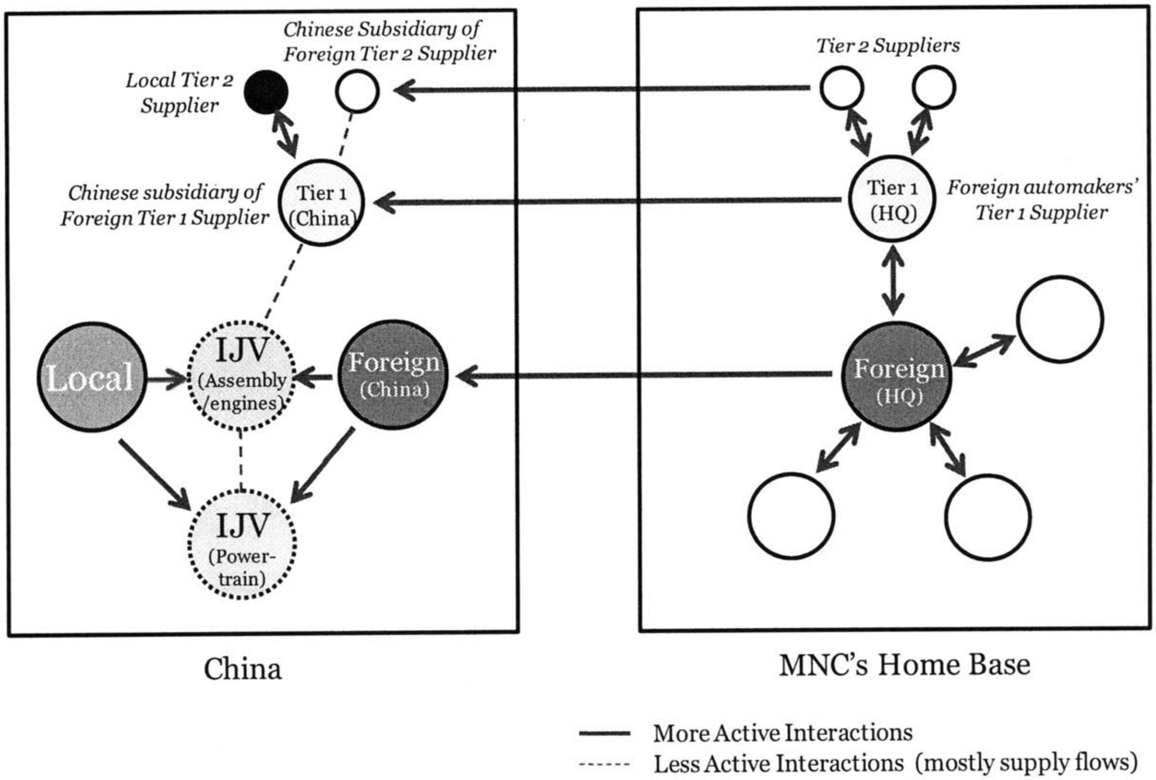

Figure 1-12: Knowledge Flows within Localized Production Networks

Note: Generalized from the cases of Sino-foreign JVs affiliated to SAIC, FAW, DFM, the Guangzhou Automotive Group, and the Beijing Automotive Industry Group.

Source: Created by the author on the basis of firm interviews.

In this production system, key knowledge and information on vehicle development does not flow within China. As Sino-foreign assembly JVs manufacture foreign-licensed vehicle models, for which development and engineering processes were already completed in MNCs' home bases, key vertical knowledge-sharing channels exist in the MNC home bases, not in China. Even the Chinese subsidiaries of global leading supply firms simply manufacture their products according to the designs provided by their HQs, lacking significant local R&D functionalities. Interactions between assemblers and supply firms are also more intensive in the MNC home bases than in China. In fact, key decisions and orders between assemblers and their primary suppliers are often fine-tuned in their homes, and then conveyed to their Chinese subsidiaries. The assembler-supplier interactions that exist in China mostly involve sourcing itself, not collaboration for development and engineering. In sum, a dearth of assembly IJVs' local technology development initiative has reduced the need for engineering and R&D supports from local supply firms.

The parts and components delivered by local indigenous supply firms are clearly distinguished from those provided by foreign-controlled supply firms. On the one hand, most parts sourced from Chinese indigenous suppliers are detail-controlled ones, for which foreign assembly JV partner firms or upper-tier foreign suppliers provide drawings and specifications.[40] This procurement pattern is sensible in light of local indigenous firms' relatively strong production capability but weak in-house development and integration capabilities. On the other hand, foreign-controlled supply firms are primarily in charge of the high value-added portion of the local supply chain (Lee *et al.*, 2004; Shu, 2009a). They have large market shares in technological sophisticated parts and components, such as engine-management systems, central control units, small motors and anti-lock braking systems, many of which fall into the black-box parts category (CATARC, 2008). In an extreme case, like electronic-stability-control equipment, all local demand is met by the products of foreign-controlled parts suppliers (Wang, 2009b).

There are some inter-firm variations in local sourcing patterns. Local production networks, initiated by VW and GM-affiliated JVs, embrace more local-parts-supply firms than others (Table 1-6). This circumstance is, in part, related to their sourcing strategies. In China, Western automakers, in general, have had more price-driven (based on more open bidding systems) sourcing policies than their Asian rivals have (Jung and Lee, 2007). When Chinese local

[40] Interviews #5, 16, 21, and 23..

suppliers have capabilities to manufacture detail-controlled parts at competitive costs, Sino-Western JVs have kept sourcing partnerships with them. For example, in 2004, 42% to 54% of the total number of the three Sino-Western JVs' (SVW, SGM, and FAW-VW) local sourcing partners were Chinese, and in 2007, 60% of SGM's local content was from Chinese suppliers.[41] In contrast, Sino-Japanese and Sino-Korean JVs showed far less dependence on Chinese suppliers. As of 2007, for example, FAW-Toyota and Beijing-Hyundai sourced less than 30% of their output values from Chinese suppliers, while over half of their output's local content was from Chinese subsidiaries of Japanese and Korean supply firms, respectively. This sourcing pattern may have been affected by the Asian automakers' geographical proximity to China or may reflect strong supplier-assembler ties embedded in the home-based production system itself.

Table 1-6: Local Souring Partners by Nationality for Selected Sino-foreign Assembly JVs

Sino-foreign Assembly Joint Ventures	*Local Souring Partners from MNC's Home Base*		*Chinese Souring Partners*	
	% of Total Local Sourcing Value	*% of Total No. of Local Sourcing Partners***	*% of Total Local Sourcing Value*	*% of Total No. of Local Sourcing Partners***
Shanghai-VW	n/a	13	n/a	54
Shanghai-GM	n/a	17	60*	42
FAW-VW	n/a	13	n/a	53
FAW- Toyota	75***	79	25***	15
DF-Nissan	n/a	43	n/a	34
DF-Yueda-Kia	60+*	29	15*	26
Beijing-Hyundai	50+*	81	20+*	6
Guangzhou-Honda	60+*	55	10*	25

Note: * as of 2007; ** as of 2004; *** as of 2002.
Source: * Firm interviews; ** Marukawa (2006); *** Tsuji and Wu (2005).

The three Sino-western JVs' considerable dependence on local Chinese suppliers is a consequence not only of the Western automakers' more open-sourcing system but also of SVW's

[41] FAW-VW shares a significant number of SVW's Shanghai-based suppliers.

early localization efforts, as discussed previously. SGM and FAW-VW share a significant number of SVW's Shanghai-based suppliers—through the mediation of SAIC (SGM's Chinese equity holder) and VW China (FAW-VW's foreign equity holder), respectively[42]—as evidenced by FAW-VW's relatively far physical distance from primary suppliers, compared with SVW and SGM's (Table 1-7).[43] This fact reflects the strong presence of quality parts suppliers in Shanghai, and suggests that the Shanghai-based supply firms have owed their improved production capabilities to their business with VW and GM's JVs in China. Vertical knowledge flows in Shanghai, however, are not exceptions to the pattern illustrated in Figure 1-12; key vertical knowledge-sharing channels exist not in Shanghai but in Wolfsburg or in Detroit. Most of the Shanghai-based local parts suppliers also lack in-house development and integration capabilities.[44]

Table 1-7: Mean Distance between Assembler and Primary Suppliers, 2004

Assembly JVs	*Main Production Base in China*	*Number of Primary Suppliers*	*Mean Distance from Primary Suppliers*
SVW	Shanghai	254	542 km
SGM	Shanghai	145	258 km
FAW-VW	Changchun, Jilin	240	1,736 km

Source: Marukawa (2006).

By and large, the IJV-initiated local production system has limited its influence on local supply firms to their production-capability building process; little influence is found in local efforts to upgrade project-execution and innovation capabilities. In fact, assembly IJVs in China

42 For example, around 20% of SVW's primary suppliers also had supply contracts with FAW-VW (Wang, 2009a).
43 A significantly large number of SVW and SGM's Shanghai-based sourcing partners are actually SAIC's subsidiaries. As of 2008, around 40% of their passenger car output value was sourced from SAIC-affiliated parts suppliers (Ping, 2009).
44 Interviews #2 and 5.

have endowed their local supply partner firms with their weak in-house innovation capability by leaving little room for potential R&D or engineering collaboration. Under the current OEM production model adopted by Sino-foreign assembly JVs, however, effectively local indigenous supply firms may take advantage of their partnership with the assembly IJVs, and most of them are likely to remain as the captive suppliers of detail-controlled parts.

4.4. Synthesis of the Section

Under the Sino-foreign JV arrangement, Chinese local automotive assembly firms have accessed advanced technologies, transferred by leading global automakers, and local-parts suppliers have also benefited substantially from the technology-transfer process. There is no question that the constituents of the Chinese automotive industry have developed better technological capabilities with the sector's IJV practices than in the past.

The SVW and SGM case suggests, however, that the IJV arrangement is not capable of nurturing every aspect of local technological capability. The IJV model's contribution has been most notable in incubating local production capability. MNCs have been active in transferring product-specific technologies and relevant production know-how to their Chinese operations. With their technology transfer, Sino-foreign assembly JVs are producing foreign automakers' up-to-date vehicle lineups in their modern manufacturing production facilities. As part of this technology-transfer process, foreign automakers have provided local engineers and shop-floor workers ample opportunities for official job training and technical assistance in order to optimize the operation of the introduced process technologies. In addition, the IJVs' growing efforts at local sourcing, incentivized both by public regulations (e.g., local-content regulation, import quota/tariffs, foreign-exchange control) and market factors (e.g., market growth and inter-firm competition), have paved the way for the growth of local supply capacity. Interactions with global automakers helped (and pushed) local suppliers to upgrade their manufacturing capability, so that their products could qualify as components of the JV-produced vehicles.

The IJV model may also induce a significant, but partial, improvement in local firms' project-execution capability. The more IJV-driven organic growth experiences SAIC accumulated, the better project-execution capability it could develop, as evidenced by the fact that SVW and SGM's more recent plant-expansion projects were completed within a shorter period of time than earlier expansions. However, the core technical portion of the plant-expansion project was done mainly by VW and GM without SAIC's significant participation. For example, VW and GM provided the assembly design to SIMEE for its actual construction, and procured necessary capital goods, mostly imports, under their primary control.[45] This practice is a convention under the Sino-foreign JV arrangement, specialized for the production of foreign-licensed vehicle models: the whole production line design and the required production facilities and equipment for the JVs should reflect foreign automakers' technologies, which the foreign automakers themselves know best. Concerning this point, it would matter little whether or not SAIC accumulated more experience in plant expansion. Regardless of SAIC's capability improvement, asymmetric information about the JV-adopted technologies would keep reserving the core technical portion of the investment project not for SAIC but for its foreign JV partner firms.

The final point that the SGM case makes clear is that even the best practice of the IJV model is unlikely to ensure a critical degree of local innovation-capability building. GM is the foreign automaker that has made the largest R&D investment in China, but its Chinese assembly operation, SGM, does not possess significant in-house vehicle-development capability, either,

[45] Interviews #2 and 19. Part of SVW's early plant construction episode is also documented in Posth (2006).

like any other Sino-foreign assembly JVs. GM's flagship China-based R&D operation, PATAC, has also defined itself as SGM's localization-supportive engineering arm, specialized primarily in minor technological adaptation tasks. SAIC, of course, has accessed GM's up-to-date technologies in the form of vehicle drawings and relevant assembly-line designs. The Sino-foreign JV arrangement, however, has not allowed SAIC either to modify such technologies without GM's consent or to utilize them for SAIC's discretionary purposes. Innovation is fundamentally a product of a continuous search process for alternative or complementary uses of existing knowledge, in combination with other various kinds of internal and external assets. The outcome of the search process is a function of the intensity of the firm's application processes as much as it is that of the firm's preexisting innovation capability. Simply mastering the "outcomes" of others' innovation does not lead to a better in-house innovation capability, without further subsequent internalizing through application practices or R&D activities. The SGM case suggests that even successful IJV practices in the developing world may not only fail to induce MNCs to bring in their critical technological capability but also may discourage local firms' self-learning process through intensive application practices.

5. Conclusions

When China's central government decided to pursue the Sino-foreign JV arrangement in the early 1980s, it had two main reasons. One was to substitute locally produced passenger vehicles for foreign imports. The IJV arrangement was initially viewed as the most feasible option to meet rapidly growing local demands for passenger vehicles without exhausting China's then-limited foreign-exchange reserves. The other reason was to incubate technologically competitive local firms within a short period of time. China's government expected that it would be able to achieve this goal by requiring foreign automakers to meet certain degrees of local content and technology standards.

In the case of SAIC-affiliated JVs, I argue that the IJV arrangement, although it might be suitable for meeting the first goal, does not serve the second purpose, primarily due to different technological development requirements for each development stage and the basic nature underlying the IJV-based learning model. Compared with the IS stage, the post-IS upgrading stage demands that local firms have a balanced combination of in-house capabilities for production, project execution, and innovation. Accordingly, the same IJV arrangement may result in different outcomes depending on development stage.

The basic nature of the IJV-based learning channel—incompleteness and passiveness—was not a serious problem in the IS stage, but it was in the post-IS upgrading stages. The IJV-learning model is incomplete, in that knowledge transferred to the IJV, set up to perform only production functions, and is limited to product-specific production technology. In most cases, MNCs have provided their IJVs with the explicit "outcomes" of their technological capabilities, not the technological capabilities themselves. The IJV arrangement has discouraged local firms from making efforts to internalize the transferred knowledge for their own goods, by putting strict restrictions on the potential use of the transferred knowledge; its modification or application for local firms' own benefit is prohibited. Accordingly, IJV-based learning has been driven mostly by mastery of the transferred knowledge and skills, related primarily to the production dimension. Further internalizing efforts beyond the mastery of the transferred innovation "outcomes" have been missing. Also, there is no official channel through which even partially IJV-based learning outcome can be spread to local firms.

The IJV-based learning mode is also passive, as the IJV arrangement allows local firms little room for maneuvering in choosing objects and methods of their learning. Under the IJV arrangement, local firms could learn only what they were supposed to learn in a given way at a given time. The knowledge gap and the asymmetric information about the IJV-adopted technologies between JV partner firms have granted MNCs a great influence over the key technical aspects of the IJV management, such as technologies to be transferred, the timing and method of transfer, and the procurement of key capital goods. Each shareholder's equity stake in the IJV has failed to endorse a comparable influence on such technical aspects of the IJV-related affairs.

Technological capabilities consist of a number of detailed sub-segments, including in-house capacity for production management and engineering, project management, basic and detailed project engineering, and basic and applied R&D. All these segments are complementary and mutually reinforcing in building overall technological capabilities. Production-related capabilities can serve as foundations for investment capabilities; skills and know-how, accumulated as results of production and investment activities, can help a firm develop better innovation capabilities. As the SVW and SGM case illustrates, the IJV arrangement has been effective in building local capabilities for production and part of the project execution task (e.g., project management and construction), but has not been effective in developing other segments of the overall technological capability (e.g., procurement, project engineering, and innovation). Accordingly, local firms have developed partial segments of the overall technological capability, and the disparity among the technological capability segments has been further deepened in the absence of a mutually reinforcing cycle. Local firms have no effective means to maneuver the

IJV arrangement to modify its nature in favor of their needs in in-house capability building process.

In this sense, it is not meaningful to discuss whether or not the IJV model is useful for local technological capability building, from a collective perspective; instead, it is necessary to understand which aspects of the capability building process in detail the IJV can contribute to and which other aspects it may not be able to contribute to. The Sino-foreign JV case suggests that the IJV arrangement itself may be at best a partial solution to nurturing the development of local firms as solid contenders in the global market, due to the very basic nature of the arrangement-involved learning mode. Perhaps the IJV-based learning model may work better when combined with other learning channels that can complement its missing dimensions and ensure that local firms have substantial maneuvering space for their proactive learning attempts.

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Chapter II

From a Passive Learner to an Active Learner: SAIC's Outward FDI Strategy

"A housekeeper can never replace a master."

— Wang Xiaoqiu, former general manager of SAIC Motor[1]

1. Introduction

What roles can "outward" globalization play in the "inward" foreign direct investment (FDI)-based technological capability-building process? In the first chapter, I showed that in the existence of a substantial gap in technological capability between alliance partners, the international joint venture (IJV)-based learning mode is likely to be "passive," as it is the party with a superior technological capability—not the one trying to learn from IJVs—that has the actual initiative in determining the key aspects of the IJV-based learning mode, such as what, when, and how to learn. My main hypothesis in this study is that outward FDI can play a critical role in turning the passive learning mode into an active one by helping learners establish access to a wide variety of external strategic resources (e.g., knowledge and skills) and encouraging subsequent self-driven, learning-by-doing practices. I will demonstrate this claim with a detailed case study of the Shanghai Automotive Industry Corporation (SAIC).

For three reasons, I believe that the SAIC case serves ideally for testing my hypothesis; (i) SAIC has operated two most successful Sino-foreign passenger vehicle assembly joint ventures

[1] Quoted in Bradsher (2006).

(JVs); (ii) SAIC at the same time is the first Chinese passenger vehicle producer that acquired foreign automotive assets and operated manufacturing operations outside China; and (iii) SAIC's independent vehicle development projects, which were delayed over two decades even with the two most successful IJV operations, have made substantial progress since SAIC made its first outward FDI in 2004. I explain each of these three points in more detail.

First, SAIC-affiliated Shanghai-Volkswagen (SVW) and Shanghai-General Motors (SGM) are among the most "successful" Sino-foreign auto assembly JVs, where success is measured as market share, local content ratios, and organizational sustainability[2] (Harwit, 1995; Gallagher, 2006; Thun, 2006). Both SVW and SGM not only have led China's passenger car sector in terms of market share[3] and localization[4] but also have continuously upgraded themselves from completely knocked-down (CKD) kit assemblers to more advanced auto producers that retain partial but non-negligible in-house research and development (R&D) and engineering capabilities (Table 2-1).[5] Those who pay attention to the best practices of Sino-foreign JVs such as SVW and SGM take a positive position toward China's JV-based catch-up model (e.g., Zhang and Taylor, 2001; Zhao *et al.*, 2005). According to them, the Sino-foreign JV is effective enough to incubate local makers' technological capabilities: foreign automakers have introduced more advanced technologies to China's market with increasing market competition while increasingly losing their control over spillovers of those technologies. The Chinese central

[2] For example, among the four earliest Sino-foreign JVs, Guangzhou-Peugeot and Panda Motor were bankrupt and liquidated by the late 1990s, while Beijing-Jeep and SVW are still operating.

[3] As of 2009, SGM and SVW held the largest passenger vehicle market shares of all other IJVs and indigenous automakers in China.

[4] The Shanghai region has the nation's strongest supply bases thanks to the success of the SVW localization project, and both SVW and SGM have sourced more product content within their corporate home base (Shanghai) than have any other China-based passenger vehicle makers (Huang and Thun, 2002; Thun, 2006).

[5] In particular, GM has invested in China-based R&D and engineering activities more than any other foreign automakers. SGM's Shanghai-based supportive engineering arm *the Pan Asia Technical Automotive Center*—which is self-capable of local adoption projects, vehicle safety testing, and concept car development—is a good example.

government, however, seems to have a pessimistic view of its "exchange-market-for-technology" catch-up regime, as its full realization is uncertain or may take too long (NDRC, 2004). In fact, although over two decades have passed since Beijing-Jeep, the first Sino-foreign auto assembly JV, was established in 1983, most Chinese automakers still depend on foreign firms for technology, and over two-thirds of local demand is fulfilled by foreign-licensed passenger vehicles.

Table 2-1: Development Stages of Big Three-affiliated Sino-Foreign JVs, 2007

Chinese	*First Auto Works*			*SAIC*			*Dongfeng Motor*		
Foreign	*KD*	*IS*	*RD*	*KD*	*IS*	*RD*	*KD*	*IS*	*RD*
GM (USA)				—	—	—			
VW (Germany)	—	—	—	—	—	—			
PSA (France)							—	—	
Toyota (Japan)	—	—							
Honda (Japan)							—	—	
Nissan (Japan)							—	—	
Mazda (Japan)	—	—							
Kia (Korea)							—	—	

Notes: ( ) in first column indicates the location of each automaker's headquarters.
KD = an early form of JVs that is specialized in knocked-down kit assembly;
IS = an intermediate form of JVs that is specialized in local license-production of foreign brand car models but purchases locally more than 60% of the total value of its final product.
RD = an advanced form of JVs that performs key R&D activities locally in cooperation with local firms, in addition to manufacturing functions.

Source: Created by the author on the basis of (i) CATARC (2008) for each JV's annual total and per-employee R&D expenditure data; (ii) Fourin (2007) and Wang (2009) for the local content ratio data of each JV's major vehicle models; and (iii) firm interviews for the information on each JV's in-house technology development projects.

Second, SAIC, the operator of the two most "successful" IJVs, made greater outward FDI earlier than any other Chinese automaker.[6] This fact suggests a certain complementarity between inward and outward globalization strategies in the path of upgrading SAIC's competitive

[6] As of 2007, SAIC held the 11th largest foreign assets valued at US$2.3 billion among China's non-financial enterprises (Fudan and VCC, 2009). SAIC was the only automaker on the top 20 list.

advantage. An asset-seeking motivation, such as exploring alternative sources for advanced technology, may underlie increasing attempts at outward globalization in China's passenger vehicle sector, in that most of the outward FDI attempts fall into the category of an intra-industry, horizontal merger and acquisition (M&A). Between 2004 and 2005, SAIC acquired the Rover portion of manufacturing assets and intellectual properties from MG Rover and the majority stake of Ssangyong Motor (SYM). Subsequently, the Nanjing Automotive Group (NAG), affiliated with the SAIC Group in 2008, took over the MG division from the MG Rover Group. More recently, Sichuan Tengzhong took over the Hummer division from General Motors (GM) in late 2009, and Geely acquired Ford's Volvo division in early 2010.

Finally, SAIC's independent vehicle-development projects, abandoned for over two decades despite SAIC's successful IJV operations, have made solid progress since SAIC made its first outward FDI in 2004. It was as early as 1959 when SAIC first produced a self-developed sedan SH760. This model, however, was in fact a reverse-engineered imitation of the 1956 Mercedes 220S (Posth, 2006), and thus does not necessarily represent SAIC's in-house capability for independent vehicle development. Without any significant technological improvements, SAIC produced SH760 (and it only) until 1991. Over a decade later, SAIC did not have a self-branded lineup, although the firm became a dominant domestic market leader with the VW and GM-branded vehicles lineups license-produced under the IJV arrangement. SAIC's own brand lineup was revived in November 2006, when Roewe 750 made its debut in the Chinese market.

It is clear that SAIC's outward globalization strategy contributed substantially to its Roewe 750 project, though the project might also have benefited from SAIC's IJV experience, as the standard-class sedan was built on the minor-upgraded Rover 75 platform, acquired from Rover between late 2004 and early 2005. In the five years since the first market appearance of

Roewe 750, SAIC has introduced 10 more self-branded passenger vehicle models, most of which were produced on SAIC's new in-house developed vehicle platforms with reference to the acquired Rover platform. SAIC's achievement in independent vehicle-development surpasses—in terms of development speed, in-house engineering contributions, and the number of self-branded vehicle models developed in-house—that of other domestic rival firms, including the First Automotive Works (FAW) and the Donfeng Motor Group (DFM). Given that until late 2009 SAIC was the only Chinese automaker having foreign-acquired manufacturing assets or foreign operations, there seems to be a reason to suspect a potential causal link between SAIC's outward FDI and its active in-house technology development activities.

Although the aforementioned three points together suggest certain key role played by outward FDI in SAIC's in-house technological capability-building process, many studies limit their discussion solely to the "inward" FDI variable, focusing on what factors caused performance variations among Sino-foreign JVs (e.g., Harwit, 1995; Zhang and Taylor, 2001; Zhao *et al.*, 2005; Gallagher, 2006). Their analytical frameworks are thus incomplete: they neglect the possibility that outward FDI, as well as inward FDI, can contribute to late market entrants' technological catch-up. In addition, even the studies that give some attention to China's outward globalization often treat the impact of outward FDI as no more than that of "one-shot" technology adoption, and rule out the possibility that outward FDI's potential contribution to technological catch-up may last beyond a short run (e.g., Nolan, 2004; Rugman, 2009). In reality, however, their assumption may not be the case. This study is motivated by the need to fill the gaps between the literature and reality.

2. Theoretical Framework and Method

As explained in the previous section, I hypothesize that outward FDI can add an "active" nature to the "passive" learning mode inherent in the inward globalization model. Here, I distinguish active learning from passive learning in terms of two aspects.[7] One aspect is who actually determines the basic nature of the learning mode. I consider a learning mode active when learners themselves can determine what, when, how to learn, while I see it as passive when teachers do so. The other aspect is what the main subject of learning is. I consider a learning strategy passive when learners seek after and absorb the *outcome* of others' technological capability, while I call it active when what learners aim to internalize is others' *technological capability itself*. My theoretical framework on the potential synergy between inward and outward FDI in improving local technological capability consists of the following three propositions (Figure 2-1).

First, as argued in Chapter 1, the contribution of inward FDI to the local technological capability-building process is at best partial. While competitive firms should develop three kinds of in-house technological capability—production, project-execution, and innovation capabilities (Amsden and Hikino, 1994)—the inward globalization learning model may be effective in nurturing production capability, but not project-execution and innovation capabilities, particularly when there exists a substantial technological gap between FDI source firms and FDI recipients. Learning-by-doing practices in the model are, by and large, limited to the dimensions of

[7] Some may attempt to define active and passive learning in more practical terms. For example, Viotti (2001) defines the "passive" learning strategy as a technological catch-up scheme aiming primarily at mastery of production capability and employing the FDI or technology-licensing arrangement, and describes the "active" learning strategy as one focusing on absorption of project-execution capability as well as production capability through self-initiated investment projects or imitation activities.

However, such a definition may not be appropriate under certain circumstances. This is because even the passive learning strategy based on inward FDI, for example, can improve not only production capability but also project-execution capability—though partially—and thus the boundary between the active and passive learning strategies can hardly be drawn in such a definitive manner.

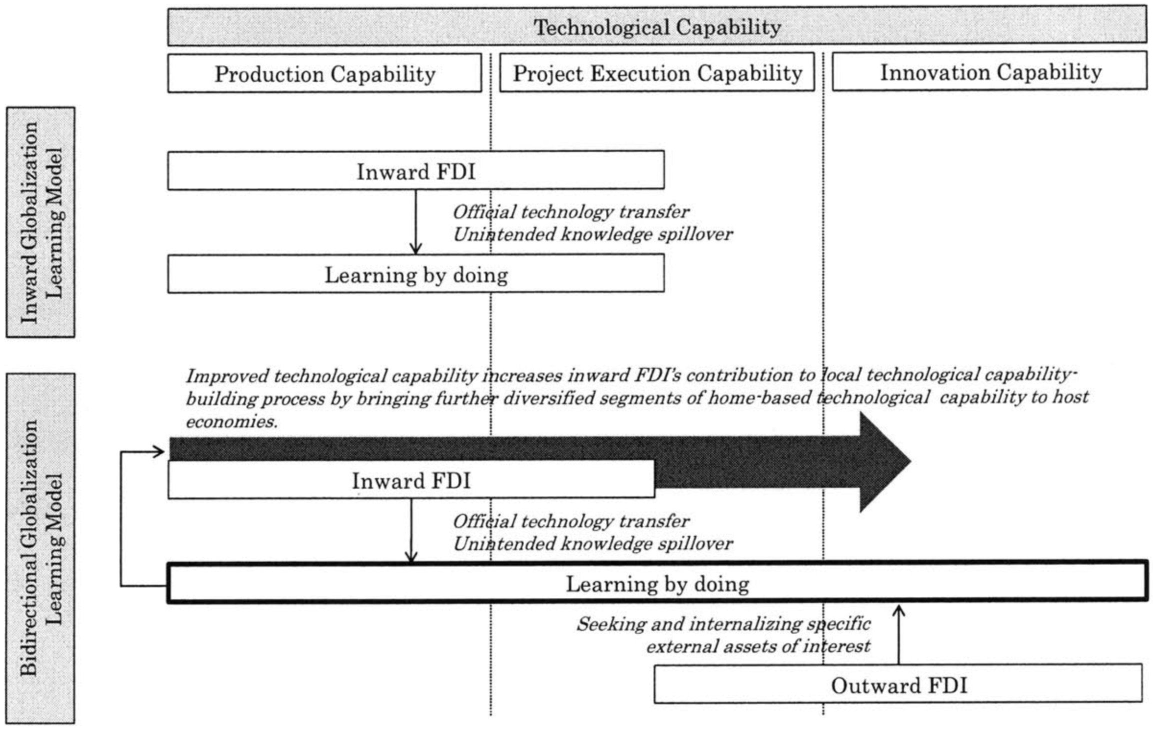

Figure 2-1: Theoretical Framework

production capability and partial project-execution skills, where FDI source firms convey advanced knowledge and know-how to local firms through official transfer or unintended spillover mechanisms.

Second, learning firms in the bidirectional globalization model initiate outward FDI for the primary purpose of improving their project-execution and innovation capabilities, which can rarely be nurtured by hosting inward FDI or subsequent self-learning practices. Appropriate outward FDI allows learners to access a broad range of external resources, some of which are hardly accessible through market transactions or strategic alliances, and subsequent learning-by-doing practices help learners to internalize the external resources in a more complete manner.

Finally, the bidirectional globalization model generates a feedback loop, which does not exist in the inward globalization model. That is, when learners succeed in improving their in-house technological capability through the combination of inward/outward FDI and subsequent self-learning practices, the improved technological capability increases the contribution of inward FDI to the local technological capability-building process by redefining MNCs' local operations to emphasize project-execution and innovation capabilities.

I use the SAIC Group and its foreign-acquired assets and operations as a case study to test the validity of my hypothesis and theoretical framework. As explained in Section 1, I choose SAIC as a case study subject because (i) SAIC is a more "successful" IJV operator than any other Chinese automaker; (ii) SAIC, at the same time, has managed overseas assets and operations on a larger scale than other local rivals have; (iii) SAIC's in-house technology development, which was stalled for over a decade when SAIC adopted the inward globalization learning model, has made substantial progress since the firm modified its technological catch-up strategy into the bidirectional globalization model in 2004; and (iv) in light of the facts listed in (i), (ii), and (iii), the SAIC case is likely to provide some key implications for the complementarity between inward and outward FDI as well as the causality between outward FDI and improved technological capability.

This study depends for data on both primary and secondary sources. I collect key data, largely unpublished, for hypothesis testing (e.g., each firm's technological upgrading strategies, stories behind key corporate events, and intra-/inter-organizational interactions) mainly from a set of one to two hour in-depth interviews with current and former employees (mostly, managers and engineers) of selected firms of my interest and several outsiders who know the firms well through formal and informal channels. The interviews use semi-structured but open-ended questionnaires. As of September 2009, a total of 25 in-depth interviews and two manufacturing plant visits (SGM and DF-Honda) were made. In addition, whenever possible, this study uses various published firm-, industry-, and regional-level statistics, including those from the China Automotive Industry Yearbook, the Fourin China Automotive Intelligence, and the China Data Online. Also, this study incorporates miscellaneous information from other reliable sources including academic journals, books, newspapers, and automotive magazines.

3. Outward FDI: Theory, Facts, and Policy

Before I discuss the SAIC case in detail, this section briefly reviews existing theories of outward FDI and the MNCs based in developing economies, and provides a glimpse of key FDI-related facts in China.

3.1. Outward FDI and Its Incentives

What motivates FDI?

Early economic theories explain cross-border capital movements as being an outcome of different interest rates across nations. This conceptual lens, though suitable for explaining portfolio investment patterns, fails to provide convincing insights for direct investment, which shows movement patterns dissimilar from portfolio investment. Hymer (1960), often considered the pioneer of modern FDI theories, distinguishes direct investment from portfolio investment, and focuses on incentives for firms' FDI, other than the interest rate. He argues that firms have incentives to hold ownership and control over their foreign operations in order to reduce market competition and thus maximize returns to their competitive advantage. In other words, direct investment is an institutional means that helps firms to create oligopolistic market conditions outside their home bases and to offset the "liabilities of foreignness" (Zaheer, 1995).

Extending Hymer's idea, Vernon (1966) sees the international expansion of corporate production bases as a firm's inevitable choice, as a function of the product life cycle and location-specific advantages. When a product is in its early life cycle, key production activities are likely to stay in home bases as its producer has strong leverage over the market for the time being (thanks mainly to its proprietary technologies) and thus cost reduction is not a key concern. But in its later stage, when the product is mature and standardized, and thus more competitors appear in the market, its producer has strong incentives to relocate its production base in order to reduce costs. The core of this explanation, i.e., that firms seek different location-specific advantages according to their product cycle, seems still valid, although the theory was originally built on Vernon's observation of only a fraction of FDI's multi-faceted nature (mainly, the efficiency-seeking aspect of North-South FDI).

Buckley and Casson (1976), Rugman (1981), and others approach the FDI question from an internalization perspective. A mainstream view of a firm's growth is that it depends on a firm's organizational capability to create competitive advantages that cannot be easily emulated by others (Penrose, 1959). Core competencies, which are essential in developing such competitive advantages, are a combination of tangible (e.g., capital, labor, etc.) and intangible (e.g., technologies, skills, etc.) internal resources (Prahalad and Hamel, 1990; Barney, 1991; Conner, 1991). A firm's incentive to engage in overseas investment is strengthening their core competencies by internalizing various country-specific or firm-specific advantages that reside outside their home base. Firms often prefer the direct investment arrangement to other alternatives such as licensing contracts, because the former can allow firms to control their core competencies (and key internal resources for them) more effectively than the latter.

Dunning's eclectic framework well synthesizes key views of FDI. His ownership-location-internalization (OLI) paradigm maintains that firms were motivated to go multinational in order to internalize ownership-specific and location-specific advantages that existed in foreign countries (Dunning, 1977). He claims that most FDI practices fall into the following four categories according to their primary incentives: resource-seeking FDI, market-seeking FDI, efficiency-seeking FDI, and asset-seeking FDI (Dunning, 1998). This framework seems to secure enough universal validity to provide critical insights into outward FDI from the developing world, a topic that still needs further examination.

3.2. FDI from the Developing World and the Third World MNCs

Most existing theories of FDI have been built on North-originated FDI cases (investment originated from advanced economies); in contrast, South-originated FDI (investment from the developed world) has not been discussed widely (Ramamurti, 2009). This is mainly because for a long time the developing economies made only a minor contribution to the world's economy as FDI sources. In the period 1989-1991, for example, the developing world accounted for only 2.7% of the global FDI outflow volume (Table 2-2). The South-originated FDI flows, though at present in a constantly increasing tendency, still account for less than 10% of the world's total annual FDI outflows. In particular, South-North FDI (up-market FDI from less advanced economies to more advanced ones) flows, on which this essay focuses, have attracted even less attention due to their

Table 2-2: Comparison of Source of FDI Flows between 1989-1991 and 2005-2007

	Developed Economies		*Developing Economies*	
Period	*Millions of US$*	*% of World Total*	*Millions of US$*	*% of World Total*
1989-1991	217,637	97.3	6,142	2.7
2005-2007	1,332,782	90.4	141,171	9.6

Source: Adapted from UNCTAD (2009), p. 221.

Table 2-3: Estimated Annual FDI Flows between High-income and Middle/Low-income Economies, 2002

Unit: billions of US$

Origin \ Destination	*High-income Economies (North)*	*Middle/Low-income Economies (South)*
North	558*	82**
South	27*	53**

Note: The North/South classification in this table follows the World Bank's definition. The North includes developed countries and a set of high-income developing economies; the South includes the rest of the world. For the detailed list of countries for each, refer to the World Bank's official website at http://www.worldbank.org/depweb/english/beyond/global/glossary.html#39.

Source: * Author's calculation from the World Development Indicator Database; ** World Bank (2006), p.111.

negligible size. Even FDI scholars long considered South-North investment flows quite rare and exceptional cases. As of 2002, South-North FDI flows accounted for less than 4% of the world's total or roughly half the annual South-South FDI volume (Table 2-3).

Despite most analysts' insufficient attention to South-North FDI, pioneering firm-level works on the subject date back to three decades ago. In his 1983 work on "Third World MNCs" (TWMNCs), i.e., MNCs headquartered in the developing world, Wells argued that the primary sources of TWMNCs' competitive advantages were a set of unique technologies that they possessed as a result of their efforts of adapting preexisting ones. TWMNCs operated on the basis of a combination of production factors and intermediate goods, which was somewhat different from the combination used by market leaders, because they were often forced to use more local inputs (instead of foreign imports) and labor (instead of capital), in the presence of the import substitution (IS) regulation. As such localized small-scale production technologies had merits in other developing countries that had the IS policy and similar local factor/market conditions and IS policy regimes, TWMNCs could expand their business to a certain degree beyond their home bases. Similarly, Lall (1983) attempted to find TWMNCs' competitive advantages in their know-how adopted and modified for closed markets. These early ideas lost their foundations with the demise of the IS regime, and may be too outdated to reflect more recent situations (Wells, 2009). However, their essence may still be relevant in part. Many scholars (e.g., Hobday, 1995; Kim, 1997; Nelson and Pack, 1999; Amsden, 2001) agree that some of the most successful enterprises in developing countries, which often have multinational production and sales bases, have developed their core competencies mainly from their competitive ability to learn and recreate existing knowledge that was formed under specific sets of policy incentives and certain degrees of market protection.

More recent studies present some updated characteristics of "emerging-market MNCs" (EMNCs), a contemporary expression replacing its dated equivalent *TWMNCs*. One of the most interesting aspects of EMNCs is their intra-regional characteristic. With few exceptions, the largest MNCs from developing countries produce and sell large proportions of their output in their home regions (Rugman, 2005). Given this fact, it may be too early to call EMNCs MNCs of a true kind, as they are not yet truly multinational (Rugman, 2009). Another interesting fact concerns the increasing asset-seeking portion of outward FDI, initiated by EMNCs. In particular, firms from China and India have shown active moves as buyers in recent cross-border M&A deals (Aguiar *et al.*, 2009). Perhaps this can be seen as an outcome of increasingly converging interests between global market leaders and market followers. Given the recent tough economic situation, more market leaders are likely to be convinced of the need to restructure their organizations with more focus on core businesses, and firms from the developing world may have a good opportunity to internalize certain strategic assets of their interest, which the former are willing to abandon as a result of their restructuring efforts.

3.3. Overview of China's FDI

Since adopting its Open Door Policy in 1979, China has employed FDI as a catalyst for its capitalist reform (Roland, 2000). Preferential treatment for foreign investors over local capitalists as well as China's huge market potential have made China one of FDI's most popular destinations (Huang, 2003). As of 2008, Mainland China captured 17.5% of FDI flows toward the developing world, which was equivalent to 6.4% of the world's total FDI inflow volume (UNCTAD, 2009). The last two decades, in particular, have witnessed an increasing rush of foreign investors into China: during this period, the amount of FDI that was newly hosted by Mainland China[8] increased more than 30 times over, from US$3.5 billion in 1990 to US$108 billion in 2008 (UNCTAD, 2010). A large fraction of FDI, received by China, took the form of green-field transactions, while the other FDI pattern—acquisition of local firms or assets by foreign investors—was marginal (UNCTAD, 2010). This pattern of hosting foreign capital, green-field investment over acquisitions, is a striking contrast to the way Chinese firms invest overseas.

In contrast to FDI received by China, overseas investment made by Chinese firms has not been of primary interest for a long time, mainly due to its relatively modest size. It was not until 2005 that China's annual outward FDI volume reached US$10 billion (the 1992 level of China's FDI inflow volume) for the first time in history. Since 2005, however, China's annual FDI outflows have soared rapidly, reaching US$50 billion in 2008 (Figure 2-2). The magnitude and speed of growth suggest that China's role as a capital exporter and China's outward FDI are worthy of greater attention. The recent rapid growth of China's outward FDI has been led by that of cross-border M&A deals rather than that of green-field investment. In 2008, for example, over 60% of China's outward FDI took the form of cross-border M&A.

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[8] Mainland China does not include Hong Kong, Macau, and Taiwan.

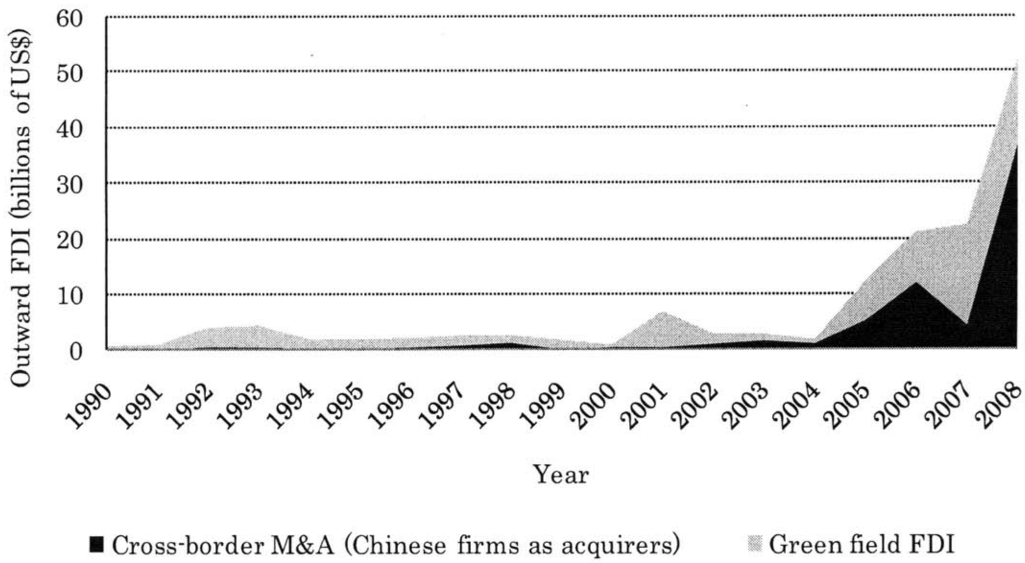
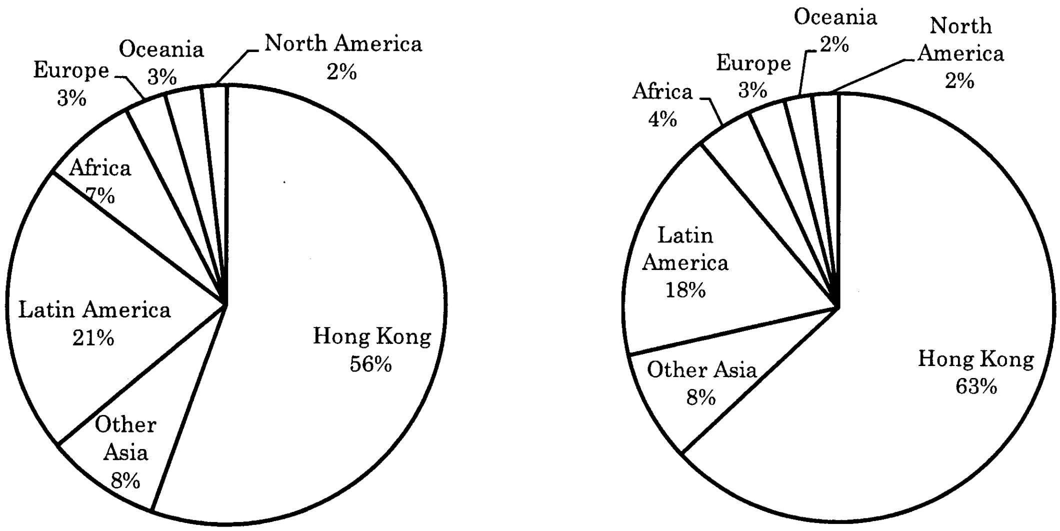


Figure 2-2: China's Outward FDI Flows (China as Origin), 1990-2008

Source: UNCTAD online database (http://www.unctad.org/templates/Page.asp?intItemID=3199&lang=1).

FDI made by Chinese firms is geographically concentrated in Asia. For the period of 2004-2008, Asia received on average 64% of China's annual outbound direct investment, and Latin America followed with 21% (Figure 2-3). The geographical distribution of China's outward FDI stock also illustrates an extremely Asia-biased pattern. One point to be highlighted here is that the top three destinations, which account for three-quarters of China's 2004-2008 mean annual outward FDI flows and its stock as of 2008, are small open economies that have generous corporate-tax policies. Hong Kong (55% in flows and 63% in stock) was the single dominant destination of China-originated direct investment, followed by the British Cayman Islands (15% in flows and 11% in stock) and the British Virgin Islands (5% in flows and 6% in stock). Given this fact, the official statistics on China's outward FDI used in this section may not capture a precise picture of China-exported capital's actual geographical distribution, as the tax havens are



(a) Annual Mean FDI Outflows, 2004-2008

(b) Outward FDI Stock, 2008

Figure 2-3: Geographical Distribution of China's Outward FDI

Note: The British Cayman Islands and the British Virgin Islands are counted as Latin America.
Source: Computed from the P.R.C. Ministry of Commerce *et al.* (2008).

often intermediate locations for FDI, not final destinations. One extreme example of this concern is "round-tripping" FDI, which refers to China's outbound FDI that is imported back to China. It is widely believed that China's official inward FDI statistics have been overestimated at least by 20% due to "round-tripping" FDI flows (World Bank, 1996; Wong and Chan, 2003).

In the meantime, the sectoral target of China-originated overseas direct investment has been shifting to the tertiary industry, away from the primary sector. During the early period of China's overseas direct investment, resource-seeking FDI was substantial. According to China's Ministry of Foreign Trade and Economic Cooperation (MOFTEC), the natural-resource-exploiting sector accounted for roughly 30% of China-originated FDI flows between 1979 and 1998 (Yang, 2005). The main incentives behind the resource-seeking FDI from China include

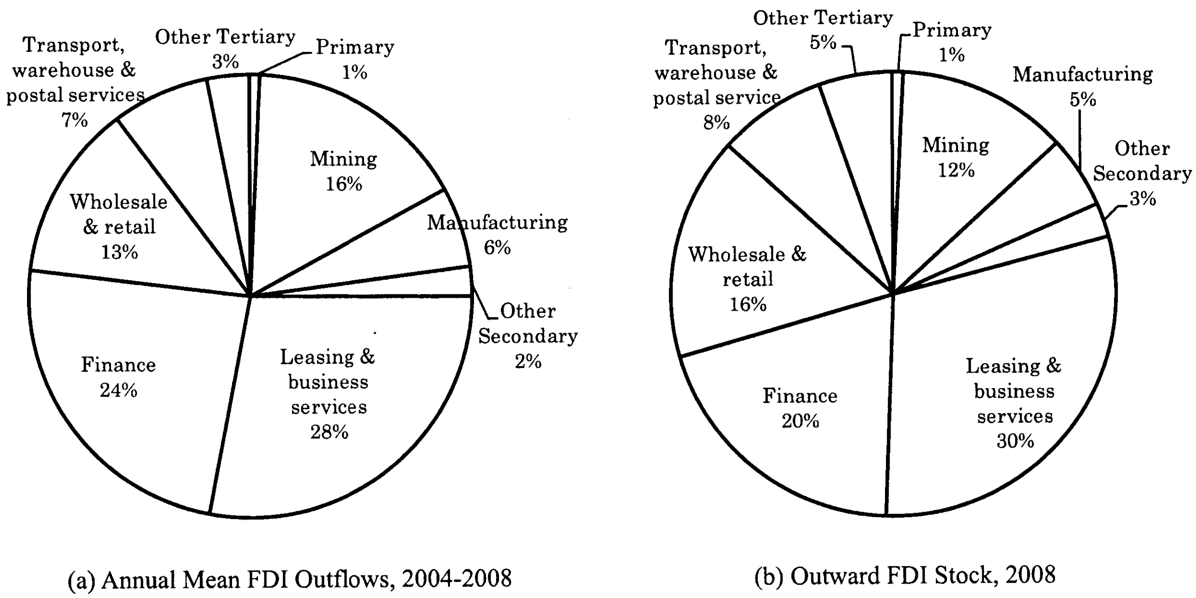


Figure 2-4: Sectoral Distribution of China's Outward FDI

Source: Computed from the P.R.C. Ministry of Commerce *et al.* (2008).

soaring demand for raw materials and the poor quality of some key natural resources in China[9] (Zhan, 1995; Cai, 1999).

Recently, however, the tertiary sector has been a major sectoral target of China's outward FDI. For the period 2004-2008, three-quarters of China's annual outward FDI went to the service sector, including leasing and business services, finance, and wholesale and retails, and only slightly less than a quarter of it was targeted to the secondary sector (Figure 2-4). The sectoral distribution of China's outward FDI stock is not much different from that of its annual flow. As of 2007, seven out of China's 18 leading non-financial MNCs (in terms of foreign assets) were in basic sectors (oil refinery, power generation, and steel making), five were in the consumer-

[9] For example, China has massive iron ore reserves, but most of them are poor in quality, in terms of iron content. Therefore, China imports a substantial amount of iron ore from other countries such as Australia, in order to ensure a certain quality of steel-products or reduce iron production cost (Tcha and Wright, 1999).

product manufacturing sector, and the other five were in logistics, construction, and other sectors; among the 18 Chinese MNCs, 16 (the exceptions were Lenovo and Haier) were state-owned enterprises (Fudan and VCC, 2009). This fact raises the possibility that the Chinese government is a main actor behind China's outward FDI.

3.4.China's Automotive Policy: From Inward to Outward Globalization

The Five Year Plans (FYPs) for the period 1986-1995 placed an emphasis on FDI-induced inward globalization to modernize the domestic automotive manufacturing sector without being constrained by foreign exchange reserves. The FYPs—China's economic master plans that provide national economic development outlines and sector-specific growth strategies—incorporated guidelines for the automotive sector development until the State Planning Commission (SPC) announced its first detailed automotive industry policy in 1994. The automotive sector was firstly designated as a national pillar industry[10] in the seventh FYP (1986-1990), and its status as a national pillar industry was firmly established in the eighth FYP (1991-1995) (Chu, 2008). In this period, import substitution (IS) in the passenger vehicle sector was the primary policy goal of the automotive sector. The SPC picked six local auto assemblers as the nation's strategic passenger vehicle makers—often described as three majors and three minors[11]—and encouraged them to form IJVs with leading global automakers for IS implementation purposes.

The IJV-based IS strategy was recapitulated in the 1994 automotive industry policy—

[10] The SPC used the term *pillar industry* to indicate specific segments of the secondary sector that have large multiplier effects on the national economy and thus rank high in the pecking order for national resource allocation. The pillar industries, specified in the eighth FYP, include machinery, electronics, automotive, petro-chemical, and construction sectors.

[11] In this period, the *three majors* were FAW, SAIC, and DFM; the *three minors* were the Beijing Automotive Works, the Guangzhou Automotive Group, and the Tianjin Automotive Industry Corporation.

China's first comprehensive policy framework dedicated to the automotive sector. This sector-specific industrial policy reflected the central government's concern that the automotive sector was contributing to the national economy less than expected as a pillar industry.[12] This policy aimed at mobilizing nation-wide resources and capability to incubate two to three large global players, which have competitive in-house vehicle-development and volume-production capability, and six to seven sizable local automakers, which can serve the fast-growing domestic market with partial vehicle-development capability, by the end of the 20th century. The 1994 policy saw the IJV-arranged exchange-market-for-technology strategy as the most feasible means to attain the goal—i.e., incubating competitive China-based automakers. In particular, the six IJVs[13] that the policy targeted were expected to play critical roles in reshaping and upgrading the existing (i) industrial organization[14], (ii) operation scale[15], (iii) industrial location[16], and (iv) production technologies. The ninth (1996-2000) FYP maintained the 1994 automotive policy in many respects. One point to be noted is that the ninth plan made it clear that the passenger vehicle segment was at the heart of the national automotive industry policy. Around two-thirds of the total auto sector development budget was allocated to the sector's passenger vehicle portion.

In the tenth (2001-2005) FYP, the Chinese central government signaled a shift in its future industrial policy direction: from *injinlai* (inward globalization) to *zoucuqi* (outward globalization). By 2000, the major exporter country became the world's second largest foreign

[12] In 1993, the automobile manufacturing sector accounted for only 1.43% of China's total industrial value-added. *Note:* the industry excludes the construction sector, *Source:* computed from CATARC (1994) and NBSC (1994).
[13] The six IJVs are SVW, FAW-VW, DF-Citroën, Beijing-Jeep, Guangzhou-Peugeot, and Tianjin-Daihatsu.
[14] The 1994 policy specified that the Chinese government would focus on creating an oligopolistic market situation, where the three largest firms hold a joint market share of 70% or higher.
[15] In 1993, there were 124 automakers in China, and their annual vehicle output volume was on average only 10,458 units. *Source:* computed from CATARC (1994).
[16] In 1990, for example, China's major auto assembly plants were geographically dispersed throughout 27 provinces—only three provinces (Hainan, Xizang, and Ningxia) did not have auto assembly plants within their administrative boundaries (CATARC, 1991).

exchange reserve holder, and confronted increasing pressure for currency appreciation from the global community. Outward FDI was viewed as an effective means by which China could relax the pressure while showing off its expanded role in the world's economy. In 2002, the 16th National Congress of the Communist Party of China included outward FDI in China's official policy agenda. As follow-up actions, in 2004 the Ministry of Commerce published the Countries and Industries for Overseas Investment Guidance Catalogue[17], in which potential investment (or M&A) target industries are listed by country; in 2005 the Chinese government substantially simplified administrative procedures necessary to initiate outward FDI.

An updated automotive industry policy was announced by the National Development and Reform Commission (NDRC)[18] in 2004. This policy makes it clear that China aims to nurture four to five large automotive groups that can be contenders for the list of the world's top 500 corporations. Accordingly, the policy priority shifts from import substitution to firm-level competitive advantage, and emphasizes scale-up and technological capability. For scale-up, the 2004 policy encourages intra-industry M&As and vertical integrations, and allows large firms with a market share of 15% or higher (i.e., the Big Three automotive groups) to initiate their own development plans.

One noteworthy change in the 2004 policy is its emphasis on indigenous technology and brand development, away from dependence on inward FDI and IJVs. In other words, the former market-technology-exchange strategy has been officially abandoned. The primary reason for this

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[17] 对外投资国别产业导向目录 (Countries and Industries for Overseas Investment Guidance Catalogue)。The summary is available at http://www.china.com.cn/chinese/PI-c/626171.htm.

[18] In 2003, the State Planning Commission was merged with the State Council Office for Restructuring the Economic System and part of the State Economic and Trade Commission to form the NDRC. At present, the NDRC is China's top economic development authority in charge of national economic master plans and other key socio-economic policies.

change is that independent automakers like Chery and Geely responded more actively to the government's request for independent vehicle technology and brand development than primary industrial policy target SOEs operating IJVs (Chu, 2008). The change in the automotive policy direction reflects top policy makers' growing skepticism about the IJV-based sequential catch-up model—i.e., from the CKD IJV through the joint R&D IJV to the local automaker with independent technological capability. Many forms of preferential treatment for foreign investors have been discontinued so that high-performing indigenous local firms are not discriminated against, and substantial local R&D investments are required as a condition for new IJV investments or existing IJV expansions.

In addition, the 2004 policy emphasizes outward FDI as one way to access advanced foreign technology. This means that outward FDI, which in the past the Chinese government considered a macroeconomic policy measure to mitigate trade frictions (or global pressure for local currency appreciation), is now regarded as part of industrial policy. The 11^{th} FYP reaffirms the major policy directions formulated in the 2004 policy and encourages local automakers' investment in other countries as a way to implement its new "leapfrogging development" model, which replaces its former FDI-based "sequential catch-up" model.

3.5. Implications for This Study

Although MNCs from the emerging market economies are rapidly expanding their roles in the global economy, scholars have paid little attention to the developing world as a source of FDI. Dunning's OLI approach, discussed in Section 3.1., seems to be universally valid in its theoretical framework, but the approach's further generalization—beyond the cases of MNCs from advanced economies—needs support from more studies on the TWMNC cases. As argued in Section 3.2., a subset of South-North FDI that is initiated for asset-seeking purposes may need more attention, as the literature on the subject, in particular, is sparse, but such FDI appears to be forming a new mainstream FDI trend.

One of the key characteristics of China's outward FDI, introduced in Section 3.3., is Chinese firms' clear preference for M&As over green-field investment as their primary outward-FDI mechanic. This fact may suggest that Chinese firms' overseas investment is motivated by their desire to internalize others' firm-specific assets (e.g., production skills, managerial and marketing know-how, R&D capability, distribution and sales network) rather than by their intent to benefit from location-specific advantage (e.g., factor-input/market conditions in a particular location).

Section 3.4. shows that this point is the case for China's most recent automotive industry policy. In contrast to the 1994 policy, where inward FDI and the IJV arrangement were emphasized for import substitution and technological catch-up purposes, the 2004 policy asks domestic automakers to initiate more self-driven technology development efforts combined with active *outward* globalization, in order to achieve the same goal. The 2004 policy is evidence of the Chinese government's recognition of outward FDI as a strategic tool to spur local firms' technological capability-building process. In addition, the revised direction of the automotive policy may reflect the limitation of the IJV-based *inward* globalization strategy as a technological catch-up model, which the Chinese government learned from the last two-decade IJV experiment in the domestic automotive sector.

In sum, the literature reviewed in this section suggests that the following case study of SAIC's outward FDI has value in the following two respects. First, the study of the SAIC case, as it is, enriches the existing literature on the asset-seeking FDI originated from the developing world. Second, the SAIC case illuminates outward FDI's potential roles in technological capability-building process (e.g., synergy with inward FDI), which have gone largely unexplored or have often been misunderstood in the existing literature.

4. A Case Study: the Shanghai Automotive Industry Corporation

This section explores the puzzle of why SAIC, a "successful" in-house capability builder with inward FDI (i.e., the Sino-foreign JV arrangement), went outside its home base seemingly for asset-seeking purposes earlier than any other Chinese automaker. In particular, I focus on how the outward globalization strategy has affected SAIC's technological learning outcome.

4.1. Acquisition of Rover and MG Assets

SAIC was the first Chinese passenger-car maker that secured sizable foreign operations. The primary motivation for SAIC's outward FDI was both internal and external. On the one hand, the SAIC Group itself recognized certain limitations involved in JV-based catch-up, and thus had an incentive to consider alternative sources of learning. This point will be discussed further in Section 4.3. On the other hand, the Chinese central government, which had reached the same conclusion that its "exchange-market-for-technology" strategy for the local auto sector development was not as fruitful as intended, has placed more emphasis on the *zoucuqi* strategy since the mid-2000s (NDRC, 2004; Luo *et al.*, 2010). Recently, the Chinese government has signaled a paradigm change by withdrawing or reducing preferential incentive packages for foreign investors, and by providing increased policy support for Chinese firms pursuing outward globalization.

SAIC took the first step in its outward FDI strategy by acquiring vehicle and engine manufacturing assets from the British sedan maker Rover. The Rover company, founded in 1904, was a division of the Rover Group. In 1994, through a series of different owners, BMW acquired all the divisions of the Rover Group, including Rover, Land Rover, Riley, Mini, Triumph, and Austin-Healey. In 2000, the Rover Group was split into three divisions: Mini, Land Rover, and the rest (MG Rover). The latter two divisions were sold to Ford and the Phoenix Consortium, respectively, while the Mini division remained part of the BMW Group. What is noteworthy is that this deal did not include the property rights of the Rover brand. BMW retained its right to the Rover brand name even after the deal. The Phoenix Consortium was allowed to use the Rover badge only for Rover's pre-existing sedan line-up.[19] This request was made by Ford as a condition of the Land Rover deal because the firm wanted to keep Land Rover's brand value from being compromised by MG Rover's market performance. According to the contract, Ford was to have the priority for negotiation if BMW determined to sell its rights to the Rover brand. In early 2005, the MG Rover Group went bankrupt and was on the market again. In July of the same year, the Nanjing Automotive Group (NAG) of China acquired key assets of the MG division including property rights to the MG brand. SAIC completed several acquisitions of Rover-owned manufacturing and intellectual assets from the MG Rover Group between November 2004 and May 2005. SAIC's acquisition of the Rover division, however, came without ownership of the Rover brand name. Ford purchased exclusive rights to the Rover badge from BMW in 2006 and sold them to the Tata Motors of India in 2008.

The acquired assets from MG Rover, although not a full package that included core labor power and brand ownership, helped SAIC move forward in terms of technological upgrading. SAIC's key acquisitions include a complete set of property rights to two models of Rover's sedan

[19] The pre-existing Rover lineups included Rover 25/45/75 models.

lineup (Rover 25/75) and the Rover Power train K-series engine.[20] In particular, the platforms and designs for Rover 75 became the matrix of SAIC's first own brand model Roewe 750. Although the Roewe 750 project was based on the adoption of pre-existing technologies rather than the creation of new ones, it helped SAIC better understand the process of passenger vehicle development and manufacturing, and better diagnose its weaknesses in the process.[21]

This deal, however, might have been no more than a simple ownership transfer of dated hard technology without SAIC's additional efforts to absorb ex-Rover R&D manpower. SAIC was aware that the ownership of two vehicle models and their relevant intellectual properties in and of itself would not be sufficient to fully assimilate the technology and know-how that underlie such outcomes. What SAIC sought outside desperately was not only tangible assets that existed in the form of drawings, specifications, or platforms, but also the tacit knowledge that was necessary to create the concrete outcomes. From SAIC's perspective, the most feasible way to secure access to such tacit knowledge behind the acquired Rover assets was through Rover's key researchers and engineers. This idea—hiring ex-Rover's key R&D manpower—was implemented successfully by employing a separate international JV arrangement. When SAIC was close to reaching a deal with Rover in early 2005, it was already discussing the establishment of an R&D JV with an England-based independent automotive technology provider, Ricardo, PLC, which had worked with most of the world's leading automakers and tier one parts suppliers.

In May 2005, shortly after the Rover deal was completed, SAIC and Ricardo PLC founded an automotive R&D JV called the Ricardo 2010 Consultants, Ltd. that would be wholly responsible for SAIC's new vehicle development projects based on the ex-Rover technology.

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[20] Interview #4.
[21] Interviews #5 and 20.

Ricardo 2010's 150 engineers, the majority of whom were recruited from Rover's core R&D division, played a leading role in the launch of the first two of SAIC's own models—Roewe 750 and 550: Ricardo 2010 was the commanding center for the whole process of the two vehicle models' adaptation, upgrade, and redesign process. In January 2007, SAIC took over Ricardo PLC's stake in Richard 2010, after the successful completion of the JV's initial mission; since then, Ricardo 2010 has been SAIC's wholly owned subsidiary. Ricardo 2010 is now functioning as the European branch of SAIC's pivotal in-house engineering arm, the Shanghai Automotive Engineering Academy, specializing in advanced R&D and adaptation for up market.

SAIC's Rover project was completed with its merger of NAG in 2008. NAG was an attractive target for a merger, primarily due to a potential synergy between SAIC-acquired Rover technologies and NAG's MG division.[22] NAG-owned MG platforms, designs, labor power, and brand name, all could complement SAIC's acquired assets. In addition, the deal allowed SAIC to enjoy a sizable passenger car manufacturing base and a new local market near Shanghai, which the SAIC management saw as critical to the group's future growth.

4.2. Takeover of Ssangyong Motor's Majority Stake

In January 2005, SAIC announced officially that it was the majority shareholder of Korea's SYM. This deal was a new milestone for China's automobile industry, as it produced the first China-based multinational automaker. Leading global automakers viewed this event with some suspicion, as SAIC's global management capability was in question, and even marriages between leading global automakers (e.g., the Daimler-Chrysler merger) often ended up in failure.

SYM is one of Korea's oldest automakers. The HaDongHwan Motor Company, the

[22] Interviews #19 and 25.

matrix of SYM, was founded in 1954. The firm, renamed Donga Motors in 1977, focused on the assembly of foreign-licensed bus and jeep lineups, which was crucial in building its identity as a sports utility vehicle (SUV) maker afterwards. In 1986, Donga Motors merged with Ssangyong Group, one of Korea's major diversified business groups. In 1998, SYM's ownership was transferred again to the Daewoo Group, Korea's then-third largest *chaebol*, having the then-second largest domestic automotive output capacity, primarily due to the government-led post-crisis restructuring drive of the late 1990s. Although Daewoo Motors (sedan) and SYM (SUV) were expected to create substantial synergy, Daewoo Group's financial insolvency in 2000 dissolved the alliance even before the realization of this synergy. SYM's ownership was transferred to the firm's major creditors. In 2005, SAIC acquired a 48.92% stake of SYM from the creditor group, after a series of bidding wars with another Chinese auto producer, the Lanxing Group.[23]

At the time of this deal, SYM was not an attractive target for merger and acquisition (M&A), from an objective stand point. Despite its long history of auto assembly and production, the firm had never achieved a leader position in Korea, in terms either of market share or technological performance. As of 2004, SYM's share in Korea's passenger car market was barely over 10%, and its annual output level of 130,783 units was still far from the sector's minimum efficient scale of one-quarter million units a year (Figure 2-5). Rising oil prices and the firm's SUV-dominant portfolio (over 88% in 2004) made SYM's future even more uncertain. Another issue was whether or not SYM had in-house technological capability worthy of acquisition. When SAIC acquired SYM, all of Ssangyong's SUV line-ups were still built on the technologically backward frame body structure instead of on the industry's standard, the

[23] Interview #19; SAIC's official website (http://www.saicgroup.com).

monocoque body technology, which ensures a higher level of vehicle safety and fuel-efficiency.[24] The firm was not equipped with competitive in-house R&D capability for core parts components, exemplified by the fact that the firm's major passenger car line-ups installed Mercedes engines under an official license agreement. SYM's Diesel-based technologies, if valuable for some reasons, could not apply directly to SAIC's gasoline-based vehicle line-ups, either.

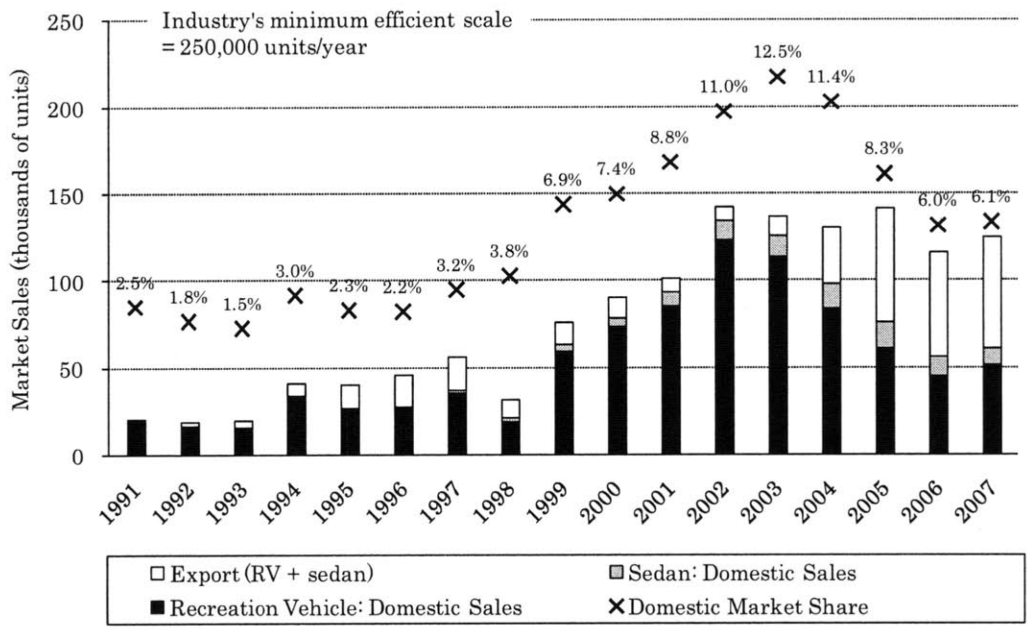

Figure 2-5: Ssangyong's Annual Sales Volume and Market Share, 1991-2007

Note: I defined passenger cars as sedans and recreation vehicles (RVs).
Source: Data from HKM (2008).

All in all, the SYM deal involved in a high risk and a low return, from a third party's viewpoint. Then, why did SAIC want SYM so desperately? SYM probably had something valuable to SAIC that others might not perceive readily. In the following two sections, I will explain this claim in detail.

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[24] Interview #15. SYM failed to develop monocoque-structured vehicle models even as of 2009.

4.3. Revisited: What is Missing in the Sino-foreign JV Arrangement

The JV is an institutional arrangement through which multiple parties can form a strategic alliance. This arrangement is appropriate if the alliance partners can create greater value from the combination of their competitive and exclusive internal resources. Complementarity, interdependency, and reciprocity among JV partner firms are primary sources that can determine the durability of the JV (Mohr and Spekman, 1994; Park and Ungson, 2001). A strategic alliance is sturdy, and JVs can last long when alliance partners need each other to create synergy and when they have a similar level of leverage power on their collective assets thanks to each party's competitive and complementary core competency (Inkpen and Beamish, 1997). Mutual learning among JV partner firms is encouraged highly in such an environment (Crossan and Inkpen, 1995; Hamel, 1991; Lane and Lubatkin, 1998; Mowery *et al.*, 1996).

However, high degrees of interdependency and reciprocity have been absent from Sino-foreign JVs. Most Sino-foreign JVs split roles between Chinese and foreign equity holders. The Chinese side is mainly in charge of dealing with the government and managing human resources and local distribution/sales networks, while foreign shareholders take the lead in most kinds of technical issues, including technology license and parts purchase. Although the official institutional arrangement ensures that each party has the same level of influence as its equity share on every decision-making process within the JV, this has not been the case for technical issues mainly due to a huge technological gap between the partner firms: MNCs have the gap-induced relative leverage power. In a certain sense, what Chinese partners contributed to the JV was things that could be learned by others relatively easily within a relatively short period of time, while what foreign partners brought to the JV was just the opposite. Also, before the 2000s, China's passenger-car market was not big enough to give Chinese automakers substantial bargaining power vis-à-vis their foreign partners. Rather, a heated bidding war among Chinese local governments, which wanted to develop the auto sector as a basic local industry, for a potential JV opportunity raised MNCs' leverage in JV-related negotiations. The success of China's "exchange-market-for-technology strategy" was uncertain under such conditions.

MNCs have not been active in sharing their knowledge with their JV partners. Perhaps weak intellectual property rights protection in China is part of the reason. Chery's best-selling model QQ, a reverse-engineered version of GM's Spark, is an example that may in part justify MNCs' strict control over their intellectual properties.[25] Some MNCs even worried that their technologies might be leaked to their rival MNCs through the mediation of their Sino-foreign JVs, because one Chinese firm often has multiple JVs with different MNCs.[26]

A more fundamental reason, however, seems to be that MNCs did not see a strong need to introduce their advanced technologies to China. From MNCs' perspective, it was too costly to clone their core in-house R&D capability in China or even to transfer part of it, given China's weak local R&D bases. Instead, they wanted to take advantage of China's huge pool of low-cost unskilled labor force. The JV arrangement did not mean more than a government-imposed obstacle that had to be cleared in order to enter China's market (Gallagher, 2006). Even at present, most Sino-foreign JVs are specialized for the assembly of foreign-developed passenger vehicles, and peripheral R&D activities, such as modification of interior designs or body frames to suit local tastes.[27]

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25 An interviewee told me that even some parts for QQ and Spark were compatible.
26 Interview #2.
27 Interviews #1, 3, 8, and 12.

When it comes to building in-house capabilities for new vehicle development, it seems obvious that current Sino-foreign JVs cannot help Chinese local automakers much. A new vehicle development project needs around five years to complete (Figure 2-6). Roughly seven stages, each of which requires half a year to one year, constitute the whole project, although different automakers may have somewhat different development and design processes. The project begins with advance engineering. This stage focuses on the development of the power-train module for a new vehicle. The design, prototype production, and testing of key power-train components, such as the engine and transmission, should be completed even before a detailed product development plan is under way. The second stage is design concept development and approval, led by the marketing or planning department. The third stage is the detailed design stage, of which the R&D department is in primary charge. Exterior and interior design is completed, and detailed drawings come out by a group of modules, such as the chassis, electrical appliances, and body. The fourth stage is to develop prototypes for the new vehicle in conformity with the drawings. As part of this

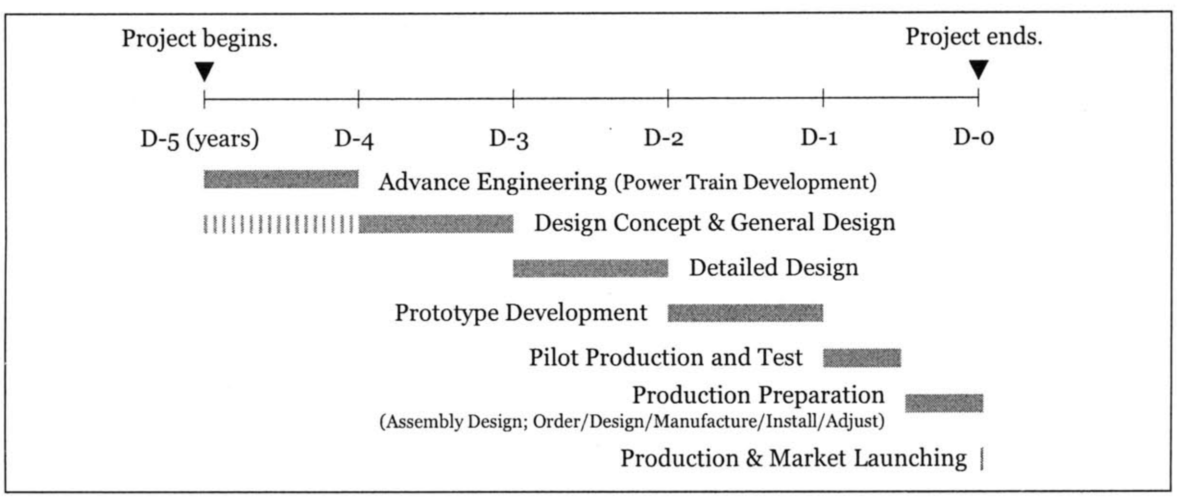

Figure 2-6: A Typical Flow Chart of a New Vehicle Development Project

Source: Created by author on the basis of Interviews # 13, 15, and 20.

task, engineers examine existing problems in parts and vehicle production, and check the quality of design and the potential market value of the product. The fifth stage is pilot production and testing. The sixth stage is preparing production: the assembly line is designed and actually installed. The final stage is production and market launching.

Of the seven stages, Sino-foreign JVs are involved in only stages 6 and 7 and part of stages 4 and 5, while core competencies of leading global automakers are based on their ability to carry out the first three stages. In particular, the power-train module and platform development of stage 1 is the essence of a new vehicle development project and greatly affects the project's success.[28] The ultimate goal of the Sino-foreign JV arrangement—that Chinese local automakers can develop their own capabilities for new vehicle development in alliance with leading global automakers—was too ambitious to be attained, primarily because Sino-foreign JVs were not set up to carry out locally the entire process of new vehicle development. Simply licensing the outcomes of the first three stages could not provide Chinese local firms with any critical learning opportunities for such essential tasks. Of course, Sino-foreign JV experiences were not very helpful in developing the organizational capacity for managing and coordinating the whole process of new vehicle development, either. Even in the presence of Sino-foreign JVs, most local firms still were not sure where to start or what to do in order to develop their in-house R&D and manufacturing capabilities in a competitive way. The learning-by-doing dynamics, which are crucial in technological catch-up (Amsden, 1989), are missing from such practices.

MNCs have also minimized the possibility of spillovers of production and manufacturing knowledge. MNCs take the initiative in determining which models to introduce in China, and

[28] Interview #15.

how manufacturing plants for these models are to be designed.[29] MNCs design manufacturing plants and determine the equipment to be installed in them: the production line needs to reflect MNC-owned production technologies. There is little room for the Chinese side's voice in the decision-making process for such matters. In the production stage, Chinese JV shareholders still have limited access to key information, including a whole set of specifications of vehicle models and core parts components. Most vital information is kept at MNCs' home base, and foreign equity holders strictly control their intellectual properties within the JV, even when such information resides in China.[30] In addition, Chinese local firms cannot own or use foreign-licensed technologies permanently. Licenses on model-specific technologies are withdrawn with model changes. The three to four years of an average model change cycle in China is not enough for Chinese firms to absorb foreign technologies, even when perfect access to such technologies is assumed.

It is also very hard to expect substantial information leakage through intra-industry trade. In the auto manufacturing sector, the simultaneous engineering approach is prevalent because it reduces time and financial costs in the new vehicle design and production process (Jurgens, 2001; Shenas and Derakhshan, 1994). From the early stages, major car assemblers operate inter-divisional and inter-disciplinary teams for new vehicle projects in close collaboration with their primary parts suppliers. VW-Bosch, Toyota-Denso, GM-Delphi, and Hyundai-Mobis alliances are examples of such partnerships. Such alliances are often formed among firms sharing the same home bases, through long-term transactional relationships. Key members of these alliances and subordinate supply networks are a kind of firmly established knowledge- and profit-sharing

[29] Interviews #19, 20, and 25.
[30] Interviews #2, 8, 12, 20, and 25.

community. There has been an increasing tendency for foreign auto assemblers to enter China's market together with their primary parts suppliers; that is, core parts components for vehicles produced in China are supplied mainly by Chinese subsidiaries of foreign automotive parts manufacturers. In this situation, their key knowledge remains within MNCs' global alliance network. In addition, the modularization trend increases the secrecy of knowledge (Baughn *et al.*, 1997). Although Chinese JV partners often make an effort to give more opportunity to Chinese local parts suppliers, such attempts are not successful because MNCs have veto power over any suppliers that fail to meet MNC-set quality standards.[31] As a result, MNC-initiated localized supply networks provide limited space for Chinese local parts suppliers, even when they are subsidiaries or primary collaborators of Chinese JV partners.

4.4. Outward FDI as a Mode of Active Learning

Given the weaknesses of the Sino-foreign JV as an institutional device for learning, it seems reasonable to link SAIC's desire to fulfill missing dimensions in its JV-based learning and a series of SAIC's foreign asset acquisitions.[32]

The acquisition of SYM allowed SAIC to access resources that its JVs strictly controlled. The first action that SAIC took after the deal was to build an information-sharing channel between SAIC and SYM.[33] As Ssangyong's primary shareholder, able to control broad aspects of the firm's management, SAIC made an intra-group inter-divisional license agreement, based on which SAIC's China-based divisions could access Ssangyong's core intellectual properties such

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[31] Interview #19.
[32] Interview #19.
[33] Interview #15.

as an entire set of drawings and technical notes for SYM's flagship passenger vehicles[34] and major parts components (Spec Watch Korea, 2009). In 2007, SYMs' intranet was fully integrated into SAIC Group's communication network, which even enabled remote access to such assets and information sharing (*ibid.*).

SYM is far from the sector's technological leader, but from SAIC's perspective, its technological assets may be more valuable than we believe. A GM-China engineer commented:

> Automakers here do not necessarily have to have the world's up-to-date technology. Even without it, you can still compete in China. For example, Chery's QQ[35] sells three times more than our Spark, despite its seemingly lower quality. The secret is price—QQ is cheaper than Spark by more than half. Mediocre-quality cars can appeal to Chinese consumers as long as they are operational and affordable. In my view, SYM's base technology is advanced enough in Chinese standards.[36]

In fact, when acquired by SAIC, SYM had an independent technology base, developed through its strategic alliance with Mercedes-Benz, and the firm's technological assets were enough to give it a significant edge in the Korean market (Salmon, 2004). It is likely that the entire set of information on vehicles and parts components, which was virtually inaccessible through IJVs, substantially reduced the time cost needed for trial-and-error-based learning.[37]

However, SAIC may have placed more value on human-embedded knowledge, which is the *source* of such technological assets, than on the technological assets themselves. The SAIC Group initiated a joint project between the group's independent division, SAIC Motor, and SYM under the leadership of the former. Annually, an average of 40 key SYM researchers and engineers were sent to Shanghai for this project.[38] Ssangyong engineers helped their Chinese

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[34] Kyron (SUV) and Chairman W (full-size sedan).
[35] Chery's QQ is a reverse-engineered imitation of SGM's Spark.
[36] Interview #2.
[37] Interview #15.
[38] Interviews #15 and 19.

coworkers interpret specifications accurately and provided other technical assistance whenever Chinese engineers met unexpected problems. More importantly, Ssangyong engineers helped SAIC Motor conceptualize how its R&D department should be organized and how a new vehicle development project should be planned, managed, and implemented. As a SAIC Motor engineer commented during our interview, what was most in need for his company was not particular technologies, to which SAIC already had fairly good access through market transactions, but a system that would enable SAIC to create such technologies.[39] In this sense, it is not meaningful to discuss whether or not SYM had cutting-edge technologies. What we need to pay attention to is the fact that SYM had much better organizational capabilities and experience than SAIC in planning, managing, and executing new vehicle development projects.

A close look at SAIC's independent vehicle development projects demonstrates how crucial outward FDI was for these projects. In 2006, the SAIC Group announced an ambitious post-IS upgrading plan in which it would develop five platforms based on its own in-house technologies, and introduce 30 of its own brand passenger-car models by 2010. At the time of announcement, the plan evoked skepticism from the mass media and the industry as a whole because SAIC then had no experience in new vehicle development, and even the world's leading automakers needed at least four years to develop a new model. As of 2009, however, SAIC's new vehicle projects seemed to be on the right track. Six platforms on which SAIC's independent passenger-vehicle line-ups are based have been completed, and at least 11 SAIC-branded models have already been introduced in the market or will be in the near future (Table 2-4).

[39] Interview #20.

Table 2-4: Details of SAIC's Own Brand Model Development Projects

Platform	*Type*	*Brand*	*Models*	*Market Debut*	*Base Technology*
No. 1	Four-wheel drive (4WD) layout for SUVs	Roewe	C200	Sep 2009	Ssangyong
Nos. 2 & 3	Front-wheel drive (FF) layout for mid-sized sedans	Roewe	350 450 550 750 BP21 750H	Dec 2009 Dec 2008 Jul 2008 Oct 2006 Jun 2010 Sep 2010	Rover
Nos. 4 & 5	Front-wheel drive (FF) layout for compact-sized sedans	MG	5Z 7Z	Jun 2009 Sep 2009	Nanjing-MG
No. 6	Front-wheel drive (FF) layout for compact-sized coupes	MG	3Z TF	Sep 2008 Jun 2009	Nanjing-MG

Source: Interview #19 and Zhang (2009).

Given that leading global automakers spend, on average, three to five years in developing new vehicles, SAIC's new vehicle development project has made comparably fast progress. It seems hard to deny that SAIC's outward FDI strategy contributed to the outcome. The improvement of pre-existing reference technologies was an easier task than the creation of something new from scratch.[40] Solid progress in the upgrading plan also suggests that SAIC has developed organizational capabilities to lead and manage multiple new vehicle development projects to a considerable degree.

4.5.Further Thoughts on the Ssangyong Deal

It seems controversial to consider the Ssangyong deal a positive factor in SAIC's upgrading strategy, in contrast to the Rover deal, as SAIC's acquisition of SYM ended up with a net loss of at least half a billion dollars. Even after SAIC took over SYM, the latter failed to reverse the

[40] Interviews #20 and 23.

situations it confronted, such as a shrinking market share and an expanding economic loss. Rising oil costs and the recent economic downturn, ignited by the US sub-prime mortgage crisis, drove SYM, with its SUV-centered product lineup, further into the corner. In late 2008, SYM's accumulated deficit increased to a level where it could not manage without external cash injections. As a result, SAIC had to determine whether or not it would invest further in its Korean subsidiary. In January 2009, the SAIC headquarters (HQ), which was pessimistic about the future of SYM, decided not to do so. Decisions as to the future of SYM were handed over from SAIC to the Korean government. In February, the Korean government decided to inject public funds to prevent Ssangyong's bankruptcy, and it froze SAIC's legal rights as the firm's majority shareholder.

Although SAIC's acquisition of SYM was a disaster from a financial perspective, it may not be so from a different angle. In the first place, it is questionable that SAIC had an interest in strengthening SYM's market position as an independent business entity: There is little evidence that SAIC made active efforts to this end. A US$1 billion investment package, which SAIC promised in public in return for its acquisition of SYM's majority stake, was not implemented until SYM went into court receivership in 2009 (Spec Watch Korea, 2006). SYM's labor union further claimed that SAIC did not initiate any Ssangyong-branded new vehicle development projects, which would have been a primary source of SYM's future market performance (Spec Watch Korea, 2006). This claim, though somewhat exaggerated, seems to have some basis, given the three-to-five-year new vehicle development project cycle and the time of the first market appearance of SYM's product line-ups concentrated between late 2005 and late 2006 (Table 2-5).

Table 2-5: SYM's Product Line-up, as of 2008

Models	*Segment*	*First Appearance in Market*
Rexton*	SUV	Apr 2006
Kyron*	SUV	Nov 2006
Actyon**	SUV	Oct 2005
Actyon Sports**	SUV	May 2006
Rodius*	MPV	Sep 2005
Chairman**	Luxury sedan	Oct 1997
Chairman W**	Luxury sedan	Mar 2008

Note: SUV = sports utility vehicle; MPV = multi-purpose vehicle.
Source: * Zhang (2009); ** HKM (2008).

SAIC's series of attempts to share SYM-owned intellectual properties with its China-based divisions made the internal conflict even worse. With the L-project contract, the internal conflict became widely known to the Korean public. The L-project was a joint project between the SAIC Group and SYM, whose legal contract negotiation was completed in June 2006. The most controversial aspect of the project was that it legally allowed SAIC's China-based divisions to share the complete set of intellectual properties (drawings, specifications, and other relevant technologies) related to SYM's then-new SUV model, Kyron, under the US$20 million license arrangement (Spec Watch Korea, 2006).

The course of the project contract was not at all smooth. In its early stages, SAIC faced intense oppositions from SYM's top management (and labor). From SYM's perspective, the L-project was a threat rather than an opportunity: SYM could not expect any potential benefits from the project, beyond the license income, while SAIC's China-based divisions using Ssangyong's up-to-date technologies were a potential threat to SYM's market position, especially if SAIC's made-in-China products, built on SYM's technologies, were exported to Korea. SYM's management and labor felt that, for its technological upgrading purposes, SAIC was forcing SYM to make unfair sacrifices. From SAIC's standpoint, however, access to SYM's strategic assets was almost all about its outward FDI. Both parties failed to reach an agreement on the project for several months.

The SAIC HQ chose shock therapy to break the impasse. In November 2005, the SAIC Group finally exercised its legal right as SYM's majority shareholder and replaced SYM's hardliner chief executive officer, Soh Jin-Kwan, with the then-director of the SYM R&D department, Choi Hyung-Tak, and appointed then-SAIC vice president Zhang Ziwei as SYM's new executive manager (Chang, 2007). In addition, some more seats of the SYM board of management were reserved for SAIC delegates. The L-project discussion between SAIC and SYM parties went well after the personnel changes and resulted in a legal contract in seven months.

Forming a pro-SAIC management was not the solution to mitigating opposition from the SYM labor, however. Since the pro-SAIC SYM management came onstage, the SYM labor union tried to form a much broader alliance in order to push SAIC away from its one-sided and coercive managerial practices. The SYM labor union used the mass media to attract public attention, allied with external actors such as the Korean Metal Workers' Union—the Korean equivalent of the United Auto Workers—and the Spec Watch Korea—a non-profit organization whose primary mission is to raise public awareness of the speculative behaviors of foreign investors in Korea.

In particular, the SYM labor union raised the following issues. One concerns the nature of the subject of the license contract. The intellectual properties for SYM's Kyron model, to which SAIC's China-based divisions were granted full access, consisted of SYM's most up-to-date technologies and know-how. In the automotive industry, it has been a very rare practice to license a firm's up-to-date technology to other external parties because such a practice may open the firm's core competences to its rivals.[41] In light of the industry's convention, it seems that the SYM labor union had some grounds for suspecting a link between the L-project and the abuse of SAIC's managerial power against SYM's benefit. The second issue raised by the SYM labor union was whether or not SAIC paid the right price for the licensed intellectual properties. According to SYM's labor union, the US$20 million license royalty that SAIC paid for the SYM technologies according to the contract, was no more than 10% of the technologies' market value (Spec Watch Korea, 2006; Chang, 2007).[42]

The conflict of interest between the stakeholders and the lack of managerial leadership to tune the conflict, exemplified in the L-project case, were serious obstacles to maximizing SYM's market potentials. Evidence shows that there were other practices similar to those of the L-project[43], and such practices further weakened the internal solidarity. The deep-rooted mutual distrust between management and labor raised SAIC HQ's skepticism as to its new investment in SYM, and the absence of timely investments gradually crowded SYM's dated models out of the market. With court receivership in 2009, SAIC's US$ half a billion seed capital, which was used to acquire the majority stake of SYM, became a sunk cost.

Such an economic loss, however, may be seen as a kind of investment, in that SAIC's primary motivation for the deal was not financial profit maximization (as evidenced by its moves after the deal) but the absorption of the SYM's vehicle design and production know-how. In this

[41] Interviews #15 and 17.

[42] In 2006, Korea's Seoul District Court, however, dismissed SYM labor union's accusation against SAIC by ruling that the L-Project and its related technology transfer contracts between SAIC and SYM did not violate any laws or regulations (Kim and Moon, 2009).

[43] In early 2009, for example, SYM's labor union filed another lawsuit against SAIC's and SYM's management, accusing SAIC of attempting to abuse SYM-possessed Diesel hybrid technologies, which were partially funded by the Korean government. In November 2009, the Suwon District Court found in favor of SYM's labor union, ruling that part of SYM-possessed hybrid technologies were leaked to SAIC without the SYM Board of Directors' appropriate approval process, let alone the issue of whether or not the technologies were valuable from an objective standpoint (Choi, 2009).

sense, SAIC seems to have obtained what it primarily aimed to get from the deal: C200, the first SAIC-branded four-wheel drive SUV model, is based on SYM's technology, and the contribution of SYM engineers to the completion of the project was crucial. Also, it may be a plus for its future multinational business that SAIC learned managerial lessons from the Ssangyong deal. In contrast to the Rover deal, which involved fixed capital assets only, the Ssangyong deal involved the acquisition of stock shares for an existing independent business entity. In the case of the latter, SAIC often met with huge resistance to its decisions from other internal stakeholders such as SYM's management and labor, as there existed a conflict of interests between them.

Apart from challenges from outside, SAIC could not deal with the internal conflict successfully, in part due to its lack of international management and cultural experience. According to a SAIC interviewee, SYM's labor union and its resistance were among the most challenging cultural shocks that SAIC experienced in Korea, as these thing did not exist in China. Even at present, labor unions do not exist in China and labor's organizational resistance to decisions made by the top management is a very rare occurrence.[44] The SAIC interviewee personally viewed such an experience as a precious asset for SAIC's managerial upgrade, and the Ssanyong deal itself as a meaningful pilot project for SAIC's growing globalization efforts.

4.6.Feedback Effect: Outward FDI as Leverage to Maneuver Inward FDI

Recently, there have been several events that symbolically have shown that the preexisting SAIC-GM strategic alliance is being reshaped in such a way as to expand SAIC's role in the alliance. SAIC's improved technological capability through its bidirectional globalization strategy seems to underlie this change.

[44] Interview #23.

First, GM has shown a clear intention to expand its China-based R&D activities. In 2007, GM announced that it would closely cooperate with SAIC to equip PATAC with full vehicle development functionality (Li, 2009). PATAC then had only *partial* engineering capability, such as minor vehicle interior/exterior modification and safety-testing, although it was the largest automotive R&D IJV project ever made in China and GM had invested in China-based R&D more than any other foreign automakers. The announcement might have met with surprise from the industry circle, given that even GM was reluctant, before its announcement, to use its Chinese operation for vehicle development. A senior engineer from GM-China commented on the change of GM's R&D strategy.

> Roewe 550/750 demonstrates that SAIC has already developed substantial vehicle development capability, though its in-house capability may not yet be as competitive as ours. Regardless of our China strategy, SAIC ultimately will find a way to get what it demands from us now, either from other foreign companies or from its own assets. In this situation, it would be wise to expand and upgrade the existing SAIC-GM alliance as SAIC wants; and the stronger alliance with SAIC would in fact not be against GM's benefit, either. We need help from SAIC for our global business as much as SAIC needs from us.[45]

This event reflects a significant change in the attitude of foreign automakers toward their Chinese operations: at least, GM has begun to consider China as a place to *develop*, not just assemble, cars. VW, SAIC's other IJV partner, has also expanded its China-based vehicle development activities (Zhou, 2009). Such a move may not be as ambitious as GM's, but is substantially ahead of most other foreign automakers operating IJVs in China, in terms of local R&D expenditure (CATARC, 2008).

Second, GM ensured SAIC more room in SGM's operational control. On December 4, 2009, SAIC took over from GM a 1% stake in SGM, and thus became the majority shareholder, controlling 51% of SGM's total equity (Ho and Shirouzu, 2009). This is the first case in China's

[45] Interview #2.

automotive sector in which the initial IJV equity-control structure was revised afterwards. Although the basic management frame remained the same—three board members from each firm—and GM had the privilege to buy back the 1% stake, SAIC would exercise stronger influence on the management of SGM and PATAC[46] with its veto rights and a deciding vote on the SGM executive board (Muller, 2010). A cash income of US$85 million provided GM with a primary incentive for this deal (Bradsher, 2009). Given the importance of Chinese operations in its global business[47], however, GM might not have reached the decision to give up its control premium over SGM unless it had substantial trust in SAIC's managerial and technological capability.

Finally, the SAIC-GM alliance seeks markets beyond China. In late 2009, SAIC and GM finalized their plan to establish a new 50-50 JV operation in India (Newton, 2009). Both firms plan to expand their JV operations to other emerging markets than India in the mid run (Bradsher, 2009). This JV project is considered a win-win partnership; GM can benefit from SAIC's financial contribution[48] and low-cost manufacturing capability[49], and SAIC views this as a good opportunity to expand its business beyond China and to become a global player[50]. This event symbolically shows that GM treats SAIC as an equal business partner, and SAIC's improved

[46] SGM controls half the equity in PATAC; SAIC and GM directly control the other half.

[47] The GM Group lost a total of US$4.8 billion in 2009, but its emerging-market operations (excluding sales in the North American and European markets) earned US$1.2 billion; roughly two-thirds of the profit from its emerging-market operations (US$764 million) came from GM's Chinese operations (Muller, 2010).

[48] Just as GM has trouble diverting tax money loaned by the U.S. government for its global business expansion projects, SAIC is likely to play a primary role in financing their India project, which is estimated to require US$400 million (Bradsher, 2009).

[49] As SAIC cooperates with GM for advanced technologies, GM also tries to learn from SAIC *how to make profits through producing cheap, compact vehicles* (low-cost vehicle production know-how), which is SAIC's core competency and would be essential to the success of GM's global business targeting emerging markets (Muller, 2010).

[50] For example, Yale Zhang, a CSM Worldwide (a Michigan-based auto-industry consultancy) analyst familiar with SAIC and GM's India project, commented: "For SAIC, the India move will allow the company to expand beyond its home market, a key step as it strives to become a global player." *Source:* quoted in Ho and Shirouzu (2009).

technological capability in part has contributed to GM's changed view of its IJV partner. Until now, no comparable practices have been found in other Sino-foreign auto assembly JVs.

In sum, all of the aforementioned events suggest that SGM, which initially functioned as GM's China-based assembly operation, has evolved into a self-contained business entity with a substantial in-house technology development capacity. This evolution path is in fact what the Chinese central government expected when it initially formulated the IJV-based "exchange-market-for-technology" strategy for its auto sector development (Chu, 2008). However, the SAIC-GM alliance case suggests that such a goal may be hardly achievable only through *inward* globalization, given that (i) only SGM, whose Chinese equity holder, SAIC, has established other alternative sources of knowledge and know-how apart from its IJVs, followed this evolution path and (ii) GM redefined its Chinese operations in such a way as to emphasize their self-contained technological capability only after SAIC had already developed significant in-house vehicle development capability through foreign asset acquisitions. In other words, it is possible that *outward* FDI not only contributes to the technological capability-building process itself by allowing a learner to establish access to complementary external resources but also creates synergy with *inward* FDI in that the improved technological capability partly through *outward* FDI can increase maneuvering space for the learner within the FDI-based strategic alliance.

5. Conclusions: Passive Learner to Active Learner

Latecomers to the market have primarily depended on inward FDI to access external resources. Wholly owned foreign subsidiaries and international JVs are at the center of such an inward internationalization strategy. MNCs necessarily bring their knowledge and know-how, in addition to capital, to host economies in the course of managing their subsidiaries or JVs, and local firms have an opportunity to build access to the intangible resources. This learning strategy, however, is passive, as key aspects of the learning process (e.g., type of resources, timing, mode of access, etc.) are controlled by foreign investors. If they depend solely on inward FDI for external resources, latecomers may confront certain constraints in their technological catch-up process.

In this essay, I argue that a portion of outward FDI from the developing world has been initiated to ease the above-mentioned constraints, with the case example of SAIC. Among Chinese automakers, SAIC is arguably the one that has made the best use of the international JV arrangement for its market position and in-house technological capability building. SAIC, however, acquired foreign assets and managed foreign operations even earlier than its local rivals. This is perhaps because SAIC, one of the oldest Sino-foreign JV operators, saw the limitations of inward FDI-based learning before the others did. Under the JV arrangement, SAIC could not accumulate enough knowledge and experience to initiate and manage the whole new vehicle development project for itself because the core R&D activities for the project were implemented outside the JVs; the final outcomes of the R&D activities were imported into China under the legal license agreement.

With the lack of base knowledge and experience, SAIC could not spur its learning-by-doing practices, either. SAIC could clear such bottlenecks of learning with its outward FDI project. Evidence shows that SAIC's new vehicle development projects are based on acquired technologies and are supported by experienced engineers from SAIC's outward FDI target firms, and the experience that SAIC accumulated from the projects propels its learning-by-doing practices. Also, outward FDI helped SAIC effectively incorporate manufacturing and assembly process know-how from its JV projects into its independent new vehicle development projects. Table 2-6 summarizes this concept.

Table 2-6: Synergy between Learning Modes: The SAIC Case

	Inward FDI	*Outward FDI*	*Learning-by-Doing*
Source of Knowledge	External	External	Internal
Nature of Learning Mode	Passive	Active	Active
Synergy with Inward FDI	n/a	Substantial	Low
Synergy with Outward FDI	Substantial	n/a	Substantial

Although this study is based on the SAIC case only, some key implications seem to be generalizable. First, technological catch-up based on inward FDI may work only up to a certain point, as the process is substantially controlled by the investor. This fact, however, does not mean that inward globalization is a bad practice, as the accumulation of capital and experience from inward globalization seems essential in employing the active learning mode in a more effective way. Second, making overseas FDI investment can provide access to certain valuable external resources that may not be accessible by hosting FDI, such as tacit knowledge. Inward and outward globalization, however, are complementary rather than substitute for each other. Inward FDI may help latecomers recognize what they have to do with outward FDI to further upgrade, and the latter may help latecomers take greater advantage of the former. Third, outward FDI may function as a turning point between passive and active learning modes. The outward FDI practice itself can be viewed in part as a latecomers' active effort to seek alternative sources of learning, and such attempts can accelerate learning-by-doing practices, which are another major source of organizational learning. Finally, the acquisition of external technologies can create sustainable sources of industrial upgrading (beyond one-time technological adoption), when it is accompanied by an effort to absorb the tacit knowledge underlying the resources. Perhaps SAIC could have gotten far less from the Rover deal, for example, if it had failed to absorb a sizable pool of ex-Rover engineers through Ricardo 2010. Moreover, SAIC's access to 1500 SYM engineers was crucial to the completion of the first SAIC-branded SUV development project.

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Chapter III

Intra-organizational Proximity as an Asset for Technological Catch-up: A Comparative Study of China's Big Three Automotive Groups

"[I]f a country has large companies or groups, it will be assured of maintaining a certain market share and a position in the international economic order. ... [I]n the next century our nation's position in the international economic order will be to a large extent determined by the position of our nation's large enterprises and groups."

— Wu Bangguo, former Vice Premier of China[1]

1. Introduction

How does intra-organizational distance affect the technological capability-building outcome of the firms seeking base technologies externally? Here, the term *intra-organizational distance* refers to the degree of inter-divisional interactions, collaboration, and resource-sharing within a multidivisional (M-form) business group, which can be assessed indirectly in terms of each division's contribution to a key group-wide project. I conjecture a causal link between intra-organizational distance and technological learning because (i) seeking external knowledge may result in substantial growth in capital or organization[2], especially when it involves the merger and acquisition (M&A) or direct investment arrangement; (ii) a unitary form corporation often becomes an M-form organization in the process of governing its increased assets or enlarged organization—the two forms of organization assign tasks differently, so the communication tasks they confront differ; and (iii) in that case, intra-group (or inter-divisional) governance may be critical in the subsequent internalization process of the acquired knowledge, and can affect the

[1] Quoted in Nolan (2001), p. 17.
[2] For example, it is a common practice in China's automotive sector that domestic firms establish new JVs with global/domestic partners or attempt cross-border/domestic M&As in order to access valuable external knowledge.

firm's overall technological performance. My main hypothesis is that intra-organizational proximity is a positive contributor to a firm-level learning outcome as it is crucial in integrating acquired knowledge from multiple sources and inducing subsequent learning practices through inter-divisional interactions.

I test this hypothesis with a comparative case study of China's three largest automotive groups: the Shanghai Automotive Industry Corporation (SAIC), the First Automotive Works (FAW), and the Dongfeng Motor Group (DFM). The following similarities and dissimilarities among them provide the rationale for my comparative approach. First, all of the three firms have grown from single-plant firms to multi-divisional business groups as a result of their organic growth, which refers to output-led growth, opposed to M&A-driven growth, and technological capability-building strategies based on international joint ventures (IJVs) and cross-border/domestic M&As. Second, in their growth paths, SAIC has kept closer intra-organizational proximity than FAW and DFM, when a set of indicators[3] for the intensity and frequency of inter-divisional interactions and collaborations are used as a proxy for intra-organizational distance. Finally, SAIC has at the same time developed more competitive in-house technological capability than FAW and DFM have, when that capability is measured as in-house R&D and engineering contribution to each firm's self-branded passenger vehicles.

Over the last two decades, China's passenger-vehicle sector has been dominated by IJV assembly operations whose equity is jointly controlled by Chinese state-owned enterprises (SOEs) and foreign automakers. Accordingly, scholars have focused on government variables[4] and IJV

[3] Examples of such indicators include primary growth mechanics (organic growth, M&As, hosting FDI, etc.), the number of self-branded independent vehicle development division, the number of key strategic alliances, the number of passenger vehicle manufacturing divisions, and spatial distance among divisions.
[4] These variables include, for example, the central government's industrial policy, which clearly specifies "pecking

partnership factors[5] as key determinants of inter-firm performance variations within the sector. These variables well explain each firm's import substitution (IS) stage performance, measured as market share and local-content ratio, because appropriate public support and timely access to foreign technology are necessary to ensure initial capital formation and its efficient operation. Such variables, however, may leave unexplained a substantial portion of the inter-firm variation in post-IS catch-up outcomes, where in-house technological capability is critical. Substantial inter-firm variations in in-house technology development may still exist, depending on their organizational learning capacity for example, even when the government or IJV partnership variables are controlled.

A firm lacking its own technological assets utilizes its production capability, built on acquired knowledge, in order to develop other segments of technological capability, such as project-execution skills and innovation capability (Lall, 1992). A firm-level organizational learning capacity is a key determinant of the technological capability-building outcome (Kim, 1995). To a firm depending on external sources for technology, learning is mostly a process of internalizing external resources through various assimilation practices. As valuable knowledge is often tacit, a more complete internalization of external knowledge can be attained with intensive learning-by-doing practices (Arrow, 1962). Also, a firm's learning outcomes in part depend on its ability to share, integrate, and coordinate certain generic knowledge and skills throughout its internal business divisions, as evidenced by some successful diversified business groups[6] from

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orders" among industrial sectors and among firms within each sector (e.g., Huang, 2003) and local governments' industrial policies, which targets firms within specific provincial or municipal administrative boundaries (e.g., Thun, 2006).

[5] For example, the degree of mutual trust and synergy between IJV equity holders, and the performance of local government as dual agents of the central government and foreign IJV equity holders (e.g., Harwit, 1995; Zhang and Taylor, 2001; Zhao *et al.*, 2005; Gallagher, 2006).

[6] For example, Japanese *keiretsu* in the post-war period and Korean *chaebol* in the last quarter of the 20th century.

the developing world (Amsden, 1989). Therefore, any analysis of a latecomer's post-IS technological upgrading needs to embrace such organizational learning perspectives.

In this study, I demonstrate that the firm growth strategy of keeping short intra-organizational distance has contributed substantially to SAIC's technological capability-building process. Then, I further discuss what key lessons we can learn from the case.

2. Method: A Comparative Case Study

I compare the cases of the Chinese Big Three automakers to test my main hypothesis. The primary rationale for my adoption of a comparative method is that substantial degrees of variation exist in their intra-group governance and in-house technology development, while those three firms share some common features, such as initial car manufacturing experience, firm sizes, government support, and basic organizational structure. Accordingly, my comparative analysis of the three firms allows us to capture a substantial portion of the proximity-learning causality with other potential key variables controlled.

2.1. Details on Case Selections

In detail, SAIC, FAW, and DFM are similar in the following four respects. First, all have a comparably long—over three to four decades—car manufacturing history (Table 3-1). FAW and DFM are China's two oldest *commercial* vehicle manufacturers, and both FAW and SAIC began *passenger* vehicle production on a public order basis as early as the late 1950s. If our discussion focuses on the volume production of modern *passenger* vehicles, SAIC, in alliance with Volkswagen (VW), entered the market in 1985, five to seven years earlier than FAW and DFM. All the three firms, however, were among the first movers in China's passenger vehicle market.

Second, all three firms have achieved comparably high economies of scale. As of 2009, their aggregate passenger vehicle market share reached 54%, and each of the three firms already built an annual passenger vehicle output capacity of over one million units. Third, the Chinese central government has put the Big Three firms at the center of its automotive industry development plan (Chu, 2008). These Chinese Big Three firms have enjoyed their preferential status in various forms of government support, such as financial resource allocation and industrial rationalization policy. Finally, all three firms have used the Sino-foreign JV arrangement as a main access point to advanced technology for passenger-car manufacturing.

Table 3-1: Brief Information on China's Big Three Passenger Car Makers, 2009

	SAIC	*FAW*	*DFM*
Ownership	Shanghai Municipal Government	Chinese Central Government	Chinese Central Government
Annual passenger vehicle production (units)	2.5 million	1.6 million	1.4 million
Passenger vehicle market share	24%	16%	14%
Year of establishment	1958	1953	1964
First year of mass production of passenger vehicles	1985	1990	1992
Own passenger vehicle brands	Roewe, MG	FAW, Xiali, Haima	Fengshen

Source: Data from Fourin (2010) and each firm's official website.

Despite their similarities, SAIC and the other two automakers have adopted different growth strategies. On the one hand, SAIC has operated its key internal organizations for passenger-vehicle manufacturing near the group's headquarters (HQ) in Shanghai, and its output growth has been achieved primarily by extending the existing IJV partnership with General

Motors (GM). On the other hand, FAW has expanded its output capacity primarily through the acquisition of other domestic vehicle manufacturers, and DFM has employed new IJV partnerships with different global automakers as a major growth vehicle. As a result, FAW and DFM's growth strategies have involved higher degrees of spatial dispersion and embraced more diverse constituents within their organizations, compared with SAIC's. In other words, SAIC has maintained seemingly shorter intra-organizational distance, in both physical and non-physical[7] terms, than FAW and DFM have.

In addition, in-house technological capability varies among the three automotive groups. When assessed in terms of their internal technology development projects, SAIC is ahead of the other two. FAW and DFM-affiliated divisions produce their self-branded vehicles under the quasi-original equipment manufacturing (OEM) arrangement. They license vehicle platforms[8] and other core technologies from multiple foreign sources, and assemble imported or OEM-produced modules according to the licensed integrated-vehicle design specifications. For example, FAW produces Hongqi on a dated Audi platform fitted with a Chrysler engine and a Volkswagen (VW) transmission. Similarly, DFM's Fengshen S30 is built on a dated Citroën platform fitted with a Peugeot engine. In contrast, SAIC-branded vehicle models more intensively exploit the group's in-house vehicle development capability. Although the first two of SAIC's own brand models (Roewe 550/750) were built on the minor-upgraded versions of the acquired Rover vehicle models, later line-ups are based on new platforms and powertrain technologies, developed internally with reference to the acquired ones.

[7] For example, the degree of commonness in institutional and cultural characteristics across subsidiaries.

[8] The vehicle platform refers to a set of core vehicle technologies, which can be shared by several vehicle models. Conventionally, a platform consists of key underbody components (e.g., engine and other powertrain subassemblies) and suspensions.

Table 3-2: Variables of Interest: China's Big Three Automakers, as of 2008

	SAIC	*FAW*	*DFM*
• Variables of interest (A set of firm-specific characteristics that may affect "intra-organizational distance")			
[1] Non-physical dimension			
- Primary firm growth mechanics of the recent decade	existing IJV partnership	domestic M&A	new IJV establishment
- Number of key strategic alliances	2 (VW, GM)	3 (VW, Toyota, Mazda)	4 (Peugeot-Citroën, Nissan, Honda, Kia)
- Passenger-vehicle output concentration ratio in product lineups*	76%	53%	39%
- Number of passenger-vehicle manufacturing divisions	4†	7††	7
- Number of self-branded passenger-vehicle divisions**	single	multiple	single
- Intra-group organizational ties***	(seemingly) strong	(seemingly) weak	(seemingly) weak
[2] Spatial dimension			
- Divisional HQs located in the group's home base**	3 out of 3	2 out of 7	3 out of 7
- Number of passenger-vehicle manufacturing bases	5	6	6
- Output concentration within 120 km radius from group HQ*	90%	50%	41%
- Output-weighted average distance between group HQ and passenger-vehicle manufacturing plants*	149 km	712 km	461 km
• Dependent variable			
- In-house research and engineering contributions to self-branded vehicles	substantial	low	low

Note: * Local-branded minibuses, which are often considered as commercial vehicles, are excluded from the computation.
** Only passenger-vehicle manufacturing divisions are considered.
*** Conjectured from each group's primary growth mechanics.
† SGM, SGM-Dongyue, and SGM-Norsom are counted as one division.
†† Tianjin FAW-Toyota and Sichuan FW-Toyota are counted as one division.

Source: Adopted and computed from CATARC (2009) and Fourin (2010), for firm-level output-related measures; other qualitative data from firm interviews and official corporate websites.

A comparative analysis of SAIC and the other Chinese Big Three, adopted as the main methodology for this study, is performed to deduce a causal link between a business group's intra-organizational distance and its group-wide technological learning performance (assessed in terms of in-house research and engineering contributions to each firm's self-branded passenger vehicle models), with some other organizational characteristics controlled. The independent variables of interest and the dependent variable are listed in Table 3-2.

2.2. Data Collection

For data, I use both primary and secondary sources. Like the previous two chapters, this study also excerpts core primary data from the 25 in-depth interviews and two manufacturing plant visits (SGM and DF-Honda) conducted in winter 2007 and summer 2008. In addition, I extensively refer to published data and documents on the selected firms, including those from the China Automotive Industry Yearbook, the Fourin China Automotive Intelligence, official corporate websites, and annual firm reports. Whenever relevant, I also incorporate partial information from academic journals, books, newspapers, and automotive magazines to crosscheck and complement the information from other sources.

3. Literature Review

In this section, I review two sets of existing literature, offering crucial implications for this study. One set is drawn from management and development studies about the interplay between the structure of large enterprises and socio-economic settings; the other set is drawn from regional studies and organizational research to examine the potential causal link between physical/organizational proximity and learning outcomes.

3.1. Large Enterprises in Diverse Economic Settings

Large enterprises may not guarantee successful industrialization, but the latter has rarely been achieved without the former. Large enterprises have remained a central institution in the world's economic development, taking a leading part in productivity growth and technological progress (Chandler and Hikino, 1997). The in-house capability of exploiting the economies of scale and scope, in particular, determines the long-term competency of large enterprises (Chandler, 1990). A minimum efficient scale for a single product, though important, may not ensure an optimal economic outcome in the long run because increasing returns to the invested production factors can be further realized when those factors are exploited for the production of other technologically related products as well. In this sense, the economies of scope are as critical as those of scale in a firm's growth. Accordingly, leading large enterprises from the developed world have grown in such a way as to incorporate various but technologically related business segments into their business portfolio (Chandler, 1990).

Large enterprises are also key institutions for late industrialization; however, leading firms from the developing world deviate from the Chandlerian growth pattern (Amsden and Hikino, 1994). Many leading market performers from late-industrializing economies are more diversified than their competitors from industrialized countries, and their business scope often covers a wide range of industrial sub-sectors having weak technological ties (Leff, 1978; Amsden, 2001). The degree of diversification is primarily a function of a firm's existing proprietary technology and in-house technological capability. From the perspective of latecomers lacking knowledge and skills, diversification has served as the most feasible strategy for moving up to more profitable and technologically challenging industrial segments. Diversification has helped latecomers manage market entry to such industrial segments through the intra-group financial subsidization between their new and well-established business segments and through the group-wide sharing of the generic segments of knowledge and skills (Amsden and Hikino, 1994).

In transition economies, large enterprises, the majority of which are SOEs, also account for a large fraction of the national economy (Roland, 2000). The SOEs in transition economies have well-focused business domains, inherited from the planned economic system. In general, a planned economy materialized the social division of labor principle by putting each SOE under the control either of a certain functional ministry of the central government or of a comparable regional organization (Nove, 1980; Granick, 1990). Chinese SOEs also have well-defined primary businesses, but China has a larger number of SOEs whose primary business function is the same than does the former Soviet Union or Eastern Europe. This is because the social division of labor principle was implemented at a provincial level in China, while it was coordinated at the central level in the former Soviet economic bloc (Qian and Xu, 1993). Accordingly, the post-reform corporatization drive in China has emphasized the reduction of inter-regional and inter-firm functional redundancy (Child, 2001).

At present, leading Chinese SOEs take the multi-divisional organizational form, in which a firm consists of multiple sub-operational units with quasi-self-contained organizational functionalities. After a series of domestic M&As, for example, the Chinese Big Three automotive groups are currently affiliated with multiple vehicle and parts manufacturing divisions, each of which has its own brand, products, and substantial managerial autonomy. Like their Western counterparts, each firm's sub-operational units in general are devoted to technologically related business activities. This outcome is, by and large, guided by the central government, which has encouraged intra-industry M&As to promote the sector's economies of scale and reshape the ex-regionally fragmented market in a more integrated fashion.

Lacking in-house technological capabilities and managerial skills, however, Chinese SOEs may confront some new challenges with their M-form organizational structure in generating group-wide synergy. Certain M-form organizations, where internal divisions with substantial managerial autonomy compete with one another, may work for firms with strong proprietary knowledge assets (Chandler, 1977); however, the centrally coordinated firm structure, which enables the internal sharing of group-wide generic project execution skills, may be a more feasible growth strategy for firms lacking such internal technological assets (Amsden, 1989). Yet, many Chinese SOEs, lacking competitive proprietary technologies, operate their M-form hierarchies without effective central monitoring (and thus coordination) mechanisms (Steinfeld, 1998). Of course, they do not need to adopt the diversification strategy to emulate the Japanese *keiretsu* or Korean *chaebol* models, which are neither necessary nor sufficient for their optimal corporate governance, particularly given the soft budget constraints that Chinese SOEs face. However, they need to transplant in-house technological capability-building dynamics, comparable to those in the successful diversified business groups, into their M-form organizational structure, analogous to that of typical Western corporations.

3.2. Proximity and Organizational Learning

Proximity involves multiple dimensions; it can be defined from geographical, cognitive, institutional, social, and organizational perspectives (Boschma, 2005). I limit the scope of discussion in this section to the concept of geographical and organizational proximity, as this study focuses on physical and managerial distance among sub-operational units within a business group.

It was economist Alfred Marshall (1890) who first recognized that a geographical clustering of firms in the same industry could generate increasing returns to the invested capital.

He called these scale economies at the industry level the external economies of scale in order to distinguish them from the conventional (internal) economies of scale at the firm level. The primary drivers of the external economies of scale, to which Marshall devoted attention, include labor market pooling, production factor/intermediate input sharing, and knowledge spillover.

Some contemporary scholars focus on the intra-industry division of labor aspect of the Marshallian industrial district model. Piore and Sabel (1984), for example, argue that the primary strength of inter-firm proximity is derived from social institutions and values embedded in it, which initiate and sustain a flexible specialization production system. They also claim that well-coordinated inter-firm division of labor, which combines a mass production system (lower cost) and a craft production system (flexibility and diversity) in an organic fashion, should be seen as an alternative capitalist paradigm to Fordism. Given increasing vertical disintegration, Scott (1988) sees the reduction of transaction and coordination costs as a primary advantage of geographical proximity. Krugman (1991a) emphasizes the transport cost savings from clustering, besides the external economies of scale, which Marshall originally highlighted.

Other analysts attend to social interactions and information flows within the territorialized production network. Jacobs (1969), for example, argues that the city as a home for new ideas has led to socio-economic and technological progress, but refutes the view that the city is simply an outcome of such progress. In line with her view of the role of space in the exchange, learning, and spread of knowledge, the access to information and tacit knowledge through localized social networks has been considered as a key incentive for geographical proximity (Utterback, 1974; Feldman, 1994; Lucas, 1998). As critical inputs for innovation and entrepreneurship, various geography-attached intangible assets—such as relational capital, institutions, cultural norms, and local conventions—affect corporate performance (Glasmeier, 1988; Saxenian, 1994; Storper, 1997; Polenske, 2001). These assets are important because a firm's competitive advantage does not depend solely on its internal resources; it instead is built on and reinforced through the resources' interplay with such external environments as factor/demand conditions, local contexts for firm strategy and rivalry, and related supporting industries (Porter, 1990). Such intra-cluster dynamics for mutual and collective learning, though occurring by and large as outcomes of unintended historical incidents and subsequent cumulative causation (Krugman, 1991b; Rauch, 1993), may be encouraged under certain sets of public policies and institutional arrangements (Cooke, 1992; Lundvall and Johnson, 1994; Asheim, 1996; Morgan, 1997).

Without certain organizational ties, however, geographical proximity alone may not lead to successful access to localized knowledge. One aspect often overlooked in cluster studies is the exclusiveness of a localized production network. Relational capital, knowledge, and other intangible assets, if substantially territorialized, are often available to the insiders of the production network only, and organizational membership in the network is necessary to access them (Florida, 2002). Accordingly, networks need to be viewed as social constructs rather than physical ones (Piore and Sabel, 1984). Empirical studies suggest that knowledge spillover is not necessarily bounded by physical proximity (Bunnell and Coe, 2001) and that tacit knowledge can convey a substantially long distance with effective centralized coordination mechanisms among sub-organizational units (Rallet and Torre, 1999).

While geographical proximity often focuses on inter-firm organizational arrangements (Polenske, 2004), organizational distance can be defined in terms either of inter-firm relations or of intra-firm organizational structure. Independent or sub-organizational units are considered close when they belong to the same relational space (e.g., a firm or an inter-firm production network) or when they share a common reference space or knowledge base (Torre and Gilly, 2000). In addition, organizational proximity is often measured as degrees of inter-dependency within or between organizations from financial or managerial aspects (Kirat and Lung, 1999).

However, divergent views on the causal link between organizational distance, defined from a relational space perspective, and organizational learning outcomes do exist. On the one hand, strong ties—close and frequent interactions within or between organizations—are often considered effective vehicles for organizational learning because they lead to timely inter-organizational knowledge sharing and integration (Krackhardt, 1992; Leonard-Barton and Sinha, 1993; Szulanski, 1996). On the other hand, weak ties—remote and infrequent relationships—may lead to more efficient learning outcomes as organizations can access a more novel and diverse set of knowledge (i.e., less redundant information) through weak rather than strong ties (Granovetter, 1973; Rogers, 1995; Uzzi and Lancaster, 2003). An eclectic view is that strong ties work better when a project involves an inter-unit transfer of complex knowledge, while weak ties are more efficient, otherwise (Hansen, 1999).

In contrast, a positive relationship is somewhat clear between organizational proximity, measured in the degree of shared reference space, and organizational performance. Organizations tend to attain higher learning outcomes when they share a greater common reference space or knowledge base (Hamel, 1991; Crossan and Inkpen, 1995; Mowery *et al.*, 1996; Baughn *et al.*, 1997; Lane and Lubatkin, 1998). In some cases, however, too much overlapped reference space may reduce incentives for inter-organizational collaboration or intra-organizational knowledge sharing. Cantwell and Santangelo (2002), for example, find that European electronics multinational corporations (MNCs) tend to locate their main R&D operations at a distance from those of their rival firms in the same industry to minimize unintended knowledge spillovers, while an R&D clustering is apparent among firms from different industries. Even within the same organization, sub-organizational units may have disincentives for inter-divisional knowledge-sharing if they have a substantially overlapped knowledge base and primary business fields. Under such conditions, sub-units may see one another as competitors rather than as members of the same economic community (Szulanski, 1996).

3.3. Implications for This Study

As reviewed in Section 3.1., large corporations have taken a leading role in industrial development, but their growth patterns are far from uniform. In China, leading large firms are often SOEs with well-focused primary business fields. China's leading SOEs have been directed to grow from single-plant firms into M-form business groups by government-led foreign direct investment (FDI) projects and domestic asset-reconsolidation practices. This centrally guided growth pattern may have brought Chinese large enterprises new challenges, such as how to govern their enlarged organizations throughout extensive administrative and spatial boundaries (i.e., increased intra-organizational distance) in order to maximize group-wide synergy.

From the literature discussed in Section 3.2., I draw the following implications for the potential link between intra-organizational distance and technological learning. First, physical proximity may be helpful in encouraging organizational learning, but the former is neither necessary nor sufficient for the latter. Second, substantial degrees of organizational proximity are necessary to promote organizational learning, though neither too excessive nor too scarce organizational proximity is likely to result in an optimal learning outcome.[9] Finally, if I limit the

[9] For example, over-reliance on the market (i.e., too little hierarchy) may be too inefficient to carry out core corporate activities due to high transaction costs (Williamson, 1983), while excessive hierarchy (or too rigid

discussion to the governance of large business groups lacking in-house technological capability, intra-organizational proximity may be an asset for organizational learning rather than a liability, as evidenced by the experience of Korean *chaebols*.

4. A Comparative Analysis: the Chinese Big Three Automotive Groups

As previously argued, organizational learning at the firm level may be substantially affected by the level of firm-wide coordination and inter-unit interactions, particularly when the internalization process involves complex knowledge, various knowledge sources, and a large organization consisting of multiple sub-operational units. In this section, I clarify this point with a comparative study of China's Big Three automotive groups.

4.1. Overview: From a Single Plant Firm to a Large Business Group

SAIC, FAW, and DFM are all huge state-owned business groups consisting of over 30 wholly owned or partially controlled subsidiaries. Most of their subsidiaries are primarily engaged in the automotive vehicle/parts manufacturing or supportive service sectors. While the sectorally focused organizational structure has been developed through over three decades of these three firms' vehicle manufacturing histories, their organic growth is particularly notable in China's post-reform period.

Since China's central government designated the automotive sector as a national pillar industry[10] in 1986, the Big Three automotive groups have been at the center of the automotive

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bureaucracy) may also be so, as evidenced by the market hegemony shift from Route 128 to Silicon Valley in the United States' electronics sector (Saxenian, 1994).

[10] China's 10th Five Year Plan (2001-2005) designates a total of 13 pillar industries, which include the machinery, automotive, electronics/information technology, metallic, non-metallic, petro-chemical, chemical, pharmaceutical, coal mining, construction materials, light industry, textile, and power generation sectors.

industry policy. In the post-reform period, China's automotive industrial policy initially outlined the sectoral arrangement of three big, three medium, and two small passenger car makers[11] (Xia *et al.*, 2002). SAIC, FAW, and DFM, which I chose as the three large players, have been the primary targets of public preferential policies such as easy access to foreign exchange reserves and subsidized credits and priority in establishing IJV partnerships. The recent Auto Industry Readjustment and Revitalization Plan[12], announced by the China State Council in March 2009, revised the sectoral profile to the four major/four minor[13] formation, with SAIC, FAW, and DFM remaining major policy target firms.

More specifically, government-driven policies targeting these three firms were prompted by a suboptimal production scale at the firm level. In 1991, when China's automotive sector was still in an early development stage, over 110 automakers were producing integrated vehicles in China, but their average annual production capacity was no higher than 7,000 units per firm (Figure 3-1). This production scale was far from the industry's conventional minimum efficient scale—an annual output of a quarter million units (Baranson, 1969). A decade later, the government's rationalization drive for the automotive sector became apparent, when the government initiated intra-industry M&As[14] and controlling domestic firms' market entrance[15]. At present, local firms on average are operated at larger scales, partly due to the public

[11] The three big makers are FAW, SAIC, and DFM, the three medium-sized makers are the Beijing Automotive Works (renamed as the Beijing Motor Group), the Tianjin Automotive Industry Corporation (merged with FAW in 2002) and the Guangzhou Automotive Group (renamed as the Guangzhou Automotive Industry Group), and the two small makers are the Chang'an Automotive Group and the Guizhou Aviation Group.
[12] For details, refer to the press release of the plan at http://www.gov.cn/zwgk/2009-03/20/content_1264324.htm.
[13] The four majors are FAW, SAIC, DFM, and the Chang'an Automotive Group, and the four minors are the Beijing Motor Group, the Guangzhou Automotive Industry Group, the Chery Group, and the China National Heavy Duty Truck Group.
[14] For example, China's 2004 Automotive Industry Development Policy encourages M&As between automakers, each of which has a market share of under 10%.
[15] Since 2004, China's central government has required a minimum total investment of RMB2 billion and an initial R&D investment of RMB half a billion, as a precondition to enter the domestic passenger vehicle market.

intervention: the local automaker's average annual output level increased from 17,527 units in 2000 to 75,918 units in 2007, and the collective annual passenger vehicle output of the Big Three automotive groups grew over six-fold, from half a million units in 2000 to 3.2 million units in 2007 (Figure 3-2).

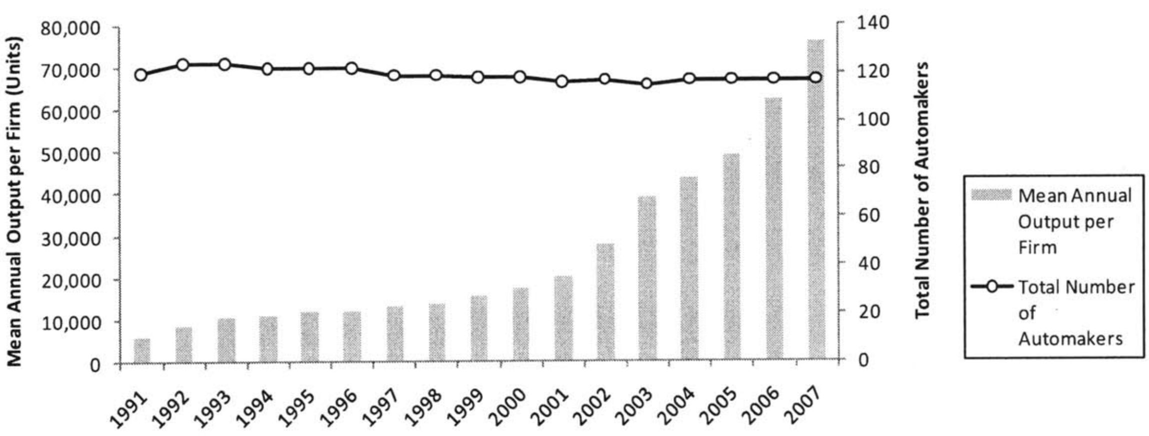


Figure 3-1: Mean Production Scale of Chinese Automakers, 1991-2007

Note: Statistics in the graph include commercial vehicles and commercial-vehicle producers.
Source: Data from CATARC (1992-2008).

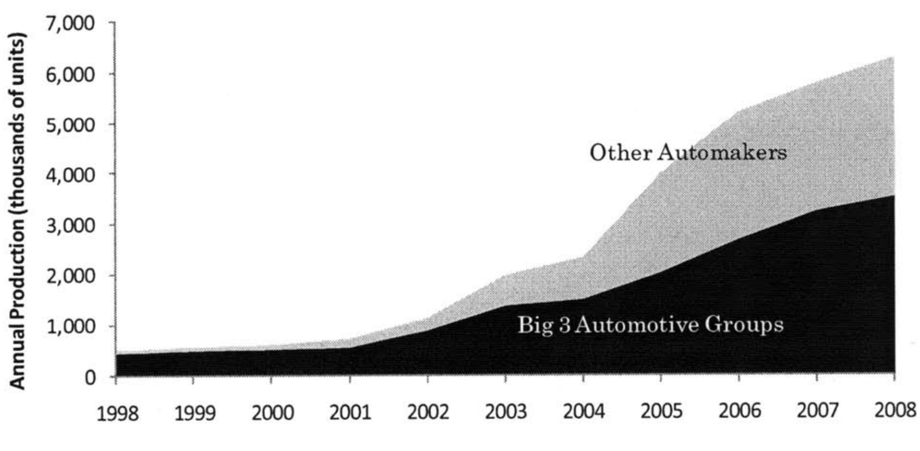


Figure 3-2: Share of the Chinese Big Three in Domestic Passenger Vehicle Market, 1998-2008

Source: Data from CATARC (1999-2009).

Despite some visible achievement, the central automotive policy tended to incentivize local automakers to pursue *extensive* growth before *intensive* growth.[16] It was not rare for local firms to take on output expansion itself, without considering improvement in efficiency, as their short-term managerial goal in order to enjoy public policies preferential to large firms. The Chinese government chose target firms primarily on the basis of size (in terms of market share) while neglecting efficiency aspects.[17] For example, the Chinese Big Three automakers were initially chosen as primary policy targets simply because they were big; they remain so, mainly thanks to their large operational scales. With such public incentive—and under soft budget constraints (due to the state ownership)—their growth strategies have often, though not always, aimed at output growth with little consideration of other strategic goals, whether they are based on IJV partnerships, M&As, or further investment in existing operations.

In addition to a low production scale, a low spatial agglomeration characterizes China's automotive sector. As previously mentioned, China's former planned economic system (which applied the social division of labor principle to provinces and comparable municipalities as self-contained economic units) inherited substantial inter-provincial redundancy in industrial investment—in other words, a low degree of spatial clustering of a particular sector at the national level. Regarding the automotive sector, the inter-regional investment coordination failure became even more obvious in the post-reform period (Huang, 2002). This is mainly because local governments exercised their increased political influence (arising from the politico-economic decentralization drive) to expand or newly create the local automotive production base for

[16] *Extensive growth* refers to the type of growth achieved with a larger amount of factor inputs and other resources but without a significant improvement in the pre-existing efficiency level; *Intensive growth* refers to the type of growth driven by improved efficiency (or higher productivity) of given factor inputs.

[17] For example, the 2004 automotive industry policy permitted only the automakers with a market share of 15% or higher to formulate their own development plans, independent of the central government guidelines.

revenue-generating purposes. A series of intra-industry asset reconsolidation practices, carried out for sectoral rationalization, led to the scale-up of each automaker on average but not to a better spatial organization of production system. As illustrated in Figures 3-3 and 3-4, the degree of spatial dispersion in the vehicle manufacturing sector actually increased over the last two decades: spatial GINI coefficients[18] declined from 0.73 in 1990 to 0.65 in 2007.

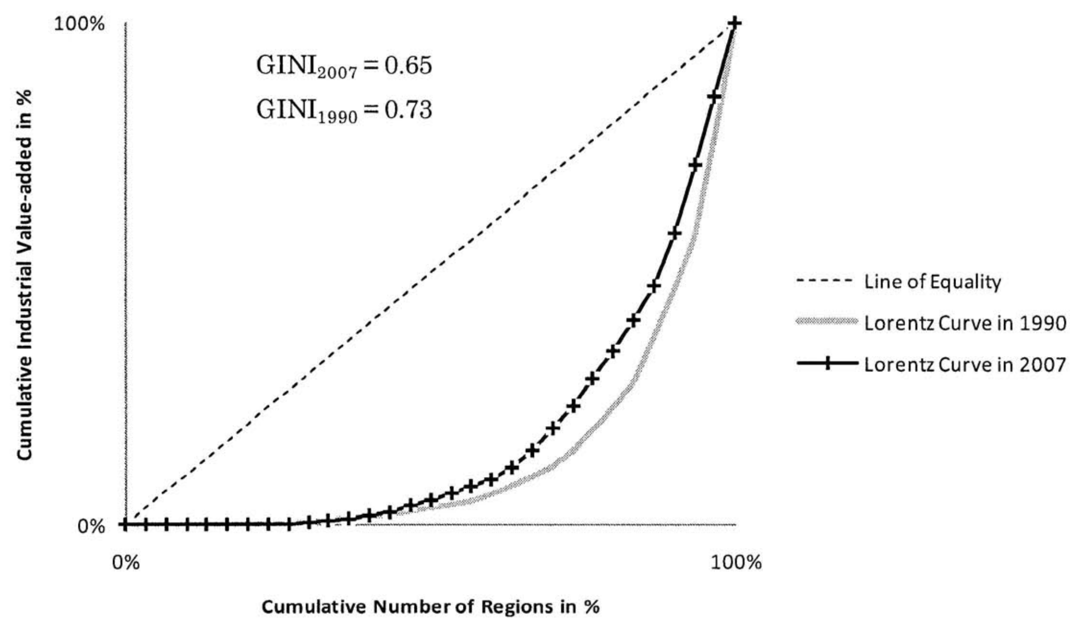


Figure 3-3: Spatial GINI Coefficients for China's Vehicle Manufacturing Sector, 1990 vs. 2007

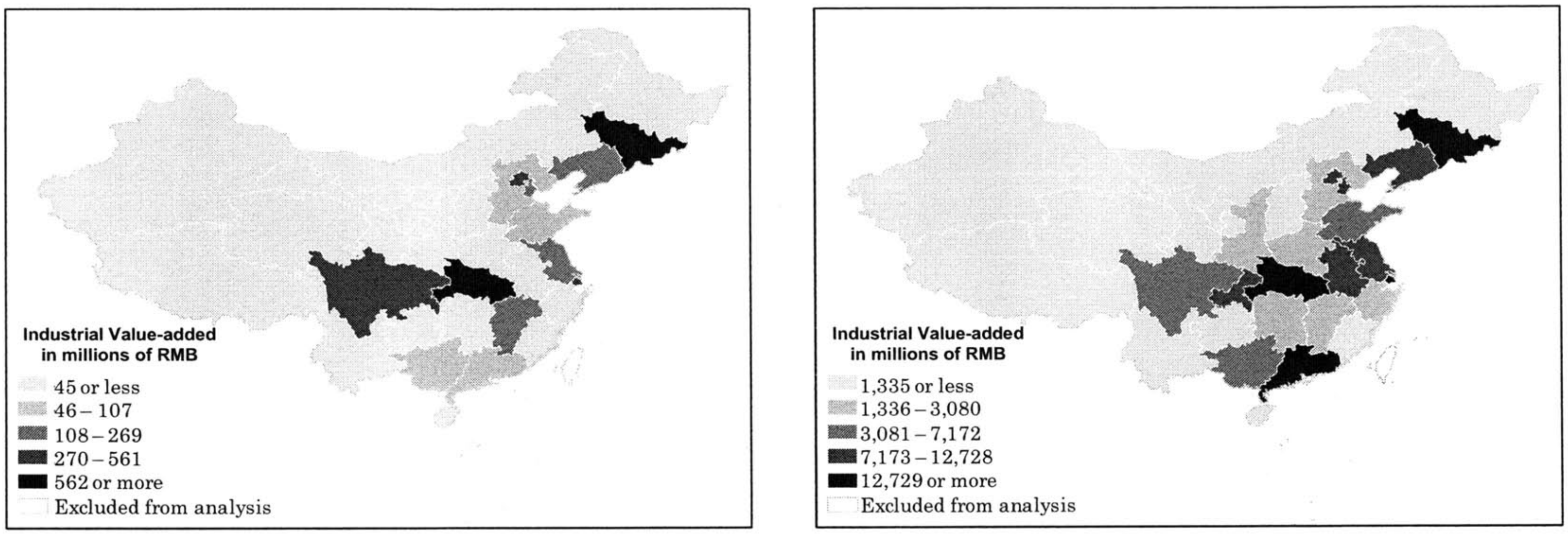
Note: Data for these graphs include value-added from manufacturing both passenger and commercial vehicles while excluding that from producing automotive parts and components.
For consistency with regional boundaries in 1990, the data for the Chongqing municipality is consolidated with that for Sichuan Province in 2007.
Data for Hong Kong, Macao, and Taiwan are excluded from this graph.

Source: Created by author; Raw data from CATARC (1991, 2008).

[18] The spatial GINI coefficient is a spatial application of the original GINI coefficient concept, which sorts sub-national regions by income in order to produce the Lorentz curve. The spatial GINI coefficient is computed as follows, and its range is between 0 (perfect equality) and 1 (extreme inequality):

$$\text{GINI} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|}{2n^2\mu}$$

where y_i is income (sectoral value-added) for region i, μ is mean regional income (sectoral value-added), and n is total number of regions.



(a) 1990

(b) 2007

Figure 3-4: Regional Distribution of Industrial Value-added in China's Vehicle Manufacturing Sector, 1990 vs. 2007

Note: Data in this map include value-added from manufacturing both passenger and commercial vehicles while excluding that from producing automotive parts and components.

Source: Data from CATARC (1991, 2008).

The increased spatial dispersion suggests that the Big Three automotive groups now need to manage not only larger organizations but also greater geographical space. As displayed in Table 3-2, in 2009 SAIC, FAW, and DFM's production concentration ratios to home base were 76%, 53%, and 39%, respectively. The comparable numbers in 2000, however, were 100%, 80%, and 100%.[19] During the same period, the number of each firm's passenger vehicle manufacturing divisions increased from two[20], three[21], and one[22] in 2000 to three[23], seven[24], and seven[25] in 2009, respectively. In addition to new IJV partnerships, the government-led sectoral rationalization drive itself, where the Big Three firms were major asset acquirers, is behind this increased spatial dispersion. Larger firm scales may mean more internal resources available to exploit, but these internal resources are likely to be diffused throughout more sub-operational units and greater geographical space. Accordingly, managerial capability necessary for effective spatial and organizational coordination became more important to create group-wide synergy from acquired external resources.[26] The following case studies and their comparative analysis will make this point clear by demonstrating that intra-organizational proximity has substantially contributed to SAIC's technological capability-building.

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[19] Like the numbers from Table 3-2, these numbers are computed from Fourin (2010) and consider passenger vehicles only.

[20] SVW and SGM.

[21] FAW-VW, FAW Car, and FAW-Haima.

[22] In 2000, DF-PSA (then, DF-Citroën) was the only passenger vehicle manufacturing division in the DFM Group. DF-Yueda-Kia, though established in 1998, did not produce passenger vehicles until 2002.

[23] SVW, SGM, and SAIC Motor (SGM-Wuling is considered as part of SGM).

[24] FAW-VW, FAW Car, FAW-Haima, FAW-Xiali, FAW-Toyota, FAW-Hongta-Yunnan, and FAW-Jilin.

[25] DF-PSA, DF-Yueda-Kia, DF-Nissan, DF-Honda, DF Passenger Vehicle Company, DF-Liuzhou, and DF-Yuan.

[26] The challenge from spatial and organizational expansions is likely to keep increasing even in the future; the 2009 Auto Industry Readjustment and Revitalization Plan makes it clear that the Big Three groups will continue to be at the center of upcoming major intra-industry M&As.

4.2. Shanghai Automotive Industry Corporation (SAIC) Group

As the first of the three case studies, this sub-section examines the SAIC Group, with primary focus on the firm's history, growth patterns, and internal hierarchies.

4.2.1. Brief History

SAIC is an SOE under the direct control of the Shanghai Municipal Government. Its history dates back to 1958, when its precursor Shanghai Automotive Assembly Plant (later restructured as the Shanghai Tractor and Automobile Corporation, or STAC) was founded. In 1959, STAC produced its first passenger vehicle model Phoenix (Fenghuang) SH760, which later was re-branded into Shanghai SH760 in 1964. SH760 was essentially a reverse-engineered imitation of the 1956 Mercedes 220S model, produced to meet local passenger vehicle demand for elite public officials (Posth, 2006). SAIC continued to produce this model until 1991, without significant technological upgrades. Between the mid-1970s and the late 1980s, the average annual production volume of the SH760 model was between 3,000 and 5,000 units. SAIC produced more passenger vehicles than any other local firm even before operating its first assembly IJV.[27] In the overall firm scale, however, SAIC was much smaller than FAW and DFM due to its small production capacity for commercial vehicles, which were then the leading market segment of China's automotive industry.[28]

SAIC's current status as a Chinese Big Three automaker was firmly established after its successful JV partnership with VW. When SVW was established in 1985,[29] SAIC's own

[27] For example, SAIC produced over 5,000 units of passenger vehicles in 1980, when China's total passenger vehicle output was only 5,418 units (CATARC, 1988/2007).
[28] As of 1985, the passenger vehicle segment accounted for less than 2% of China's total vehicle production volume (CATARC, 1994).
[29] SVW was the second IJV project in China's automotive sector, beginning its actual vehicle production in 1985.

technological capability was extremely weak. As evidenced by the continued production of the dated SH760 model, SAIC lacked in-house capabilities (and motivations) for new vehicle development. Its decrepit assembly plants and old-fashioned equipment reflected highly labor-intensive procedures, a far cry from modern vehicle production technologies. Also, few Shanghai-based parts producers met VW-required technical standards prepared for the firm's global operations to ensure certain minimum product quality.

A solid coalition between VW and the Shanghai municipal government formed in the late 1980s contributed to a substantial improvement in such preexisting conditions, unsuited for the local volume production of VW-branded vehicles.[30] On the one hand, the Shanghai municipal government showed a consistent and powerful leadership in initiating and managing its regional level localization drive (Harwit, 1995; Thun, 2006). The localization drive package—consisting of localization tax, subsidized credit, and tight monitoring system— released SVW's growth from the foreign exchange reserve constraint, and mended the coordination failure problem between SVW and its primary suppliers. On the other hand, VW responded to the public localization drive through active technology transfer. VW not only introduced modern production technologies and equipment to the Shanghai manufacturing plants but also provided SVW employees and primary parts suppliers with extensive on-the-job training and technical assistance.

SAIC's leadership in the domestic passenger vehicle market, which began with its SVW operation, has been more firmly established with its IJV alliance with GM. In 1997 SAIC and GM founded an OEM vehicle assembly JV *SGM* and an engineering JV *the Pan Asia Technical*

The first Sino-foreign automotive assembly JV project was Beijing-Jeep, which was founded in 1983 (two years earlier than SVW was) through the equity-sharing alliance between the Beijing Automotive Works (now the Beijing Automotive Group) and the American Motors Corporation (the then-owner of the Jeep brand).

[30] For further details on the synergy between SAIC and VW, see Chapter 1.

Automotive Center (PATAC) in Shanghai. GM as a second mover did not need to go through the same hardships as VW did a decade ago, because Shanghai had already developed a sound local sourcing foundation and a solid semi-skilled labor pool by the time GM entered the Chinese market. In return for the second mover advantage[31], which GM could take through its IJV partnership with SAIC, GM promised its greater commitment to SAIC's in-house technology development. PATAC—the largest single FDI project dedicated to China-based automotive R&D—was a showcase of GM's such move. The SAIC-GM partnership has extended to operate multiple assembly bases under separate JV arrangements, such as SGM-Wuling, SGM-Dongyue, and SGM-Norsom.

In 2006, the SAIC Group restructured its internal organization to form SAIC Motor, in primary charge of SAIC's self-branded vehicle development and manufacturing. After ceasing production of the dated SH760 model in 1991, SAIC put aside its independent vehicle development plan for over a decade. In the 2000s, SAIC began to consider the revival of the plan. A critical part of SAIC's strategy was foreign asset/equity acquisition: SAIC acquired Rover-owned manufacturing and intellectual assets, and a 51% equity stake in Korea-based Ssangyong Motor by 2005.[32] In 2006, SAIC Motor finally launched Roewe 750, the first of its own brand models based on the acquired Rover technologies. In 2007, the SAIC Group became the new owner of the Nanjing Automotive Group (NAG), which acquired the MG brand from the bankrupt MG Rover Group. Until recently, SAIC Motor has initiated its independent vehicle development projects with Roewe and MG brands.

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[31] From VW's perspective, SGM simply took a free ride on the local vehicle manufacturing infrastructure built on SVW-initiated localization efforts. For example, SGM shared many of SVW's primary local sourcing partners and hired a substantial number of ex-SVW employees. All these were possible with SAIC's mediation.

[32] For more details about these mergers, refer to Chapter 2.

4.2.2. Macro Analysis: Spatial and Organizational Expansion

At present, the SAIC Group operates four major passenger vehicle manufacturing divisions in five locations within Mainland China (Figure 3-5). Those four divisions include SVW, SGM, SAIC Motor, and SGM-Wuling. Among them, SGM controls Yantai-based SGM-Dongyue and Shenyang-based SGM-Norsom manufacturing plants as its secondary production bases, and SAIC Motor governs Nanjing-MG with a 100% stake in it. SGM-Wuling is a triad IJV partnership among SAIC, GM, and Liuzhou Wuling Motor, dedicated primarily to the production

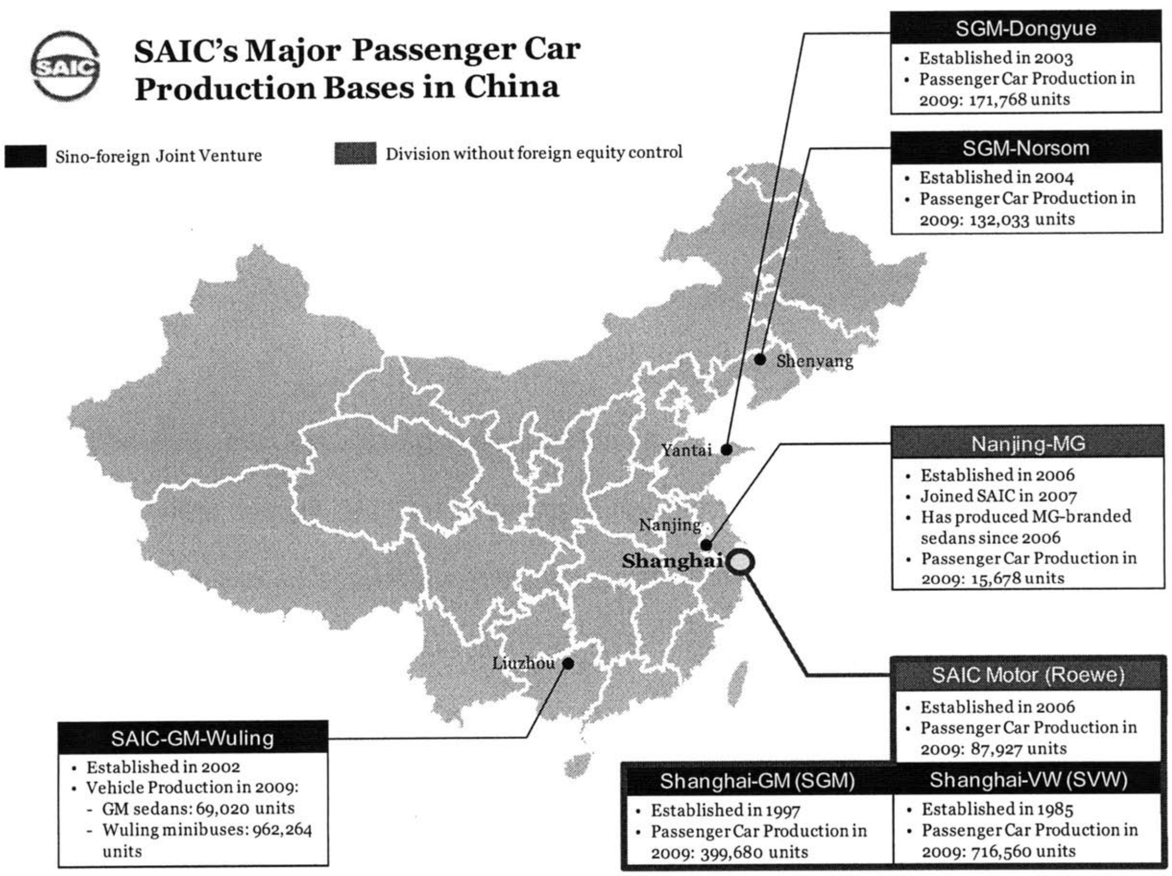

Figure 3-5: SAIC's Major Passenger Car Production Bases in Mainland China, 2009

Source: Created by author; Data from Fourin (2010) and SAIC's official website.

of commercial minibuses but with some production capacity of GM-branded compact sedans. SAIC's four major divisions are operated in five cities: Shanghai, Nanjing, Liuzhou, Yantai, and Shenyang. The SAIC operations located outside Shanghai were established through merger (Nanjing-MG) or the reorganization of preexisting assets (SGM-Wuling, SGM-Dongyue, and SGM-Norsom). Among the five locations, Shanghai is SAIC's single dominant production base, accounting for over three-quarters of the group's annual passenger vehicle volume.

Shanghai remains SAIC's dominant command center, even though the automotive group operates multiple vehicle manufacturing divisions in multiple locations. One point noteworthy is the fact that SAIC's spatial expansion did not much increase the group's intra-organizational distance as it was attained primarily by the pre-existing organizational ties. It is the SAIC-GM partnership developed through SGM that initiated subsequent SGM-Wuling, SGM-Dongyue, and SGM-Norsom projects, all of which are SAIC's out-of-Shanghai manufacturing operations (Table 3-3). SAIC and GM strategically settled those three operations out of Shanghai in order to minimize the construction time necessary for SGM's production capacity expansion by utilizing pre-existing manufacturing facilities there. Subsequently, the three divisions have been operated in accordance with SGM's China strategy. In NAG's case, the merger was motivated by SAIC's desire to create synergy between its ex-Rover assets and NAG-owned MG division, which shared a common technology base.[33] Besides close economic and cultural proximity between Shanghai and Jiangsu Province[34], the technological complementarity between the two firms played a crucial role in enhancing their inter-organizational bond after the merger. Also, substantial asymmetry between SAIC and NAG—in terms of production capacity and asset size,

[33] Both MG and Rover were the core divisions of the MG-Rover Group.

[34] Both Shanghai and Jiangsu economies have developed close economic bonds at the regional level as part of the Yangtze River Delta, one of China's five integrated mega economic regions (Ohmae, 2002).

technological and management capability, and pecking order in central government support—reduced NAG's resistance to its asset and organizational restructuring as part of the SAIC Group.[35] In sum, SAIC has still kept its initial backbone organizational structure—SAIC-VW and SAIC-GM partnerships and SAIC Motor—even after a series of spatial and organizational expansions, and Shanghai is home to the group's key governing bodies (the SAIC Group HQ and divisional HQs for SVW, SGM, SAIC Motor, and PATAC).

Table 3-3: Major Passenger Vehicle Divisions of the SAIC Group, 2009

	Equity Ownership Structure		
SAIC Divisions	*SAIC*	*Foreign*	*Others*
SVW	50%	VW: 50%	-
SGM (HQ & Jinqiao plant)*	51%	GM: 49%	-
SGM-Dongyue	25%	GM: 25%	SGM: 50%
SGM-Norsom	25%	GM: 25%	SGM: 50%
SGM-Wuling	51%	GM: 34%	Liuzhou Wuling: 15%
SAIC Motor	100%	-	-
Nanjing-MG	100%	-	-

Note: * On December 4, 2009, SAIC and GM agreed on the transfer of SGM's 1% equity from GM to SAIC, which would make SAIC the majority shareholder of the former 50-50 IJV.
Source: CATARC (2009).

The municipal ownership in particular has substantially incentivized SAIC to manage its organic growth in close proximity to Shanghai. On the one hand, the Shanghai municipal government coordinated the automotive sector development and localization drive within Shanghai, so that a large fraction of the sector's socio-economic impact could reside within its administrative boundary (Huang, 2003). Accordingly, SAIC's core organizations, production facilities, and primary sourcing partners are located near the group's HQ. On the other hand, SAIC as a locally controlled SOE had some disadvantages in acquiring domestic assets outside

[35] Interviews #19 and 25.

its home region, compared with centrally controlled SOEs such as FAW and DFM.[36] In general, inter-regional asset reconsolidation in China's automotive sector was accompanied by substantial resistance from the primary stakeholders of the consolidation target assets: most local municipalities had strong desire to keep local automotive production bases under their control in order to secure sizable public revenue sources. Such a challenge was often hard to be dealt with at the municipal level, in the absence of the support from the central government.

4.2.3. Micro Analysis: Internal Hierarchies

SAIC has managed its organic growth and spatial expansion with very clear strategic concerns. As explained before, SAIC and GM chose to build SGM's secondary manufacturing bases in Yantai and Shenyang, where sizable manufacturing facilities already existed, in order to meet soaring domestic market demands for passenger vehicles promptly by restructuring pre-existing manufacturing assets there. Shanghai's limited land reserve for their plant expansion was another concern. The spatial expansion of the SAIC-GM partnership to Liuzhou was primarily motivated by SAIC's wish to strengthen its commercial vehicle lineup.[37] SAIC's Nanjing operation was to create technological synergy between SAIC's ex-Rover assets and NAG's MG division. In sum, the SAIC Group's *intensive* growth motivation, as well as the SGM division's *extensive* growth purpose, underlies SAIC's organic and spatial expansion outcomes.

One key advantage from SAIC's firm growth strategy—Shanghai-centered growth under the solid (internal and external) organizational ties—is its ability to generate intensive horizontal knowledge flows. First, SAIC has relaxed the constraint in IJV-based learning, although the legal

[36] Interview #4.
[37] The SGM-Wuling project reflects more of SAIC's motivation than GM's, as evidenced by the fact that SAIC has the management right for SGM-Wuling with a 51% stake in the JV, while GM is primarily a profit-sharing shareholder in the operation (see Table 3-2).

IJV arrangement strictly prohibits the sharing of IJV-owned resources (whether physical or intellectual assets) with Chinese IJV stakeholder firms, more effectively than other Chinese automakers on the basis of its strong relational assets with GM. Over the last decade, SAIC and GM have developed strong mutual trust and organizational ties through a series of joint business projects. The degree and scope of their IJV cooperation has been continuously deepened and extended from OEM vehicle production to joint R&D activities for new vehicle development.[38] Also, as evidenced by the increasing joint projects between SAIC Motor (SAIC's wholly owned subsidiary) and PATAC (IJV between SAIC and GM)[39], the SAIC-GM partnership is not limited to their IJV operation. Second, SAIC's spatially controlled growth pattern has generated a greater possibility for horizontal knowledge spillovers from IJVs to other SAIC divisions through regional labor pooling. A substantial number of SAIC Motor engineers and production workers have working experiences at SVW, SGM, or PATAC, and their skills, knowledge, and know-how are critical assets for SAIC's in-house technological capability development.[40]

SAIC's close intra-firm ties have been at least as crucial as its organizational ties with outsiders like GM, for in-house technology development. Although the SAIC Group seemingly resembles in organizational structure a conventional western M-form business group, whose business divisions often compete with one another, this in general is not the case.[41] Little internal competition within SAIC is partly due to little inter-divisional redundancy in primary business activities, except its IJVs. Within the SAIC Group, for example, there is only one SAIC-branded

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[38] For example, SGM plans to release a new vehicle model, for whose development PATAC has taken a lead, in the latter half of 2010 (Interview #20).
[39] When PATAC was newly established, it was fully devoted to engineering support for SGM. But now around 10% of PATAC's business is related to SAIC Motor's new vehicle development projects (Interviews #18 and 20).
[40] Interview #20.
[41] This is to emphasize the perspective of SAIC employees: even Chinese managers in SAIC-affiliated IJVs tend to have strong identities as SAIC families rather than as IJV managers. Foreign IJV managers, in contrast, see SVW and SGM as rivals.

vehicle development division *SAIC Motor*, and each of SAIC's parts manufacturing subsidiaries is dedicated to particular products without substantial overlapping with one another. Under these conditions, there is little disincentive for inter-divisional information and resource sharing.

Also, SAIC's intra-group rotation policy seems important in controlling motivations for internal competition. Under the rotation system, each division's top management develops a stronger sense of belonging to the SAIC Group, rather than to the division. Even in SVW and SGM, Chinese managers behave much more like the agents of the SAIC HQ rather than dedicate themselves fully to the IJVs they are in charge of.[42] It is not even rare that SAIC managers have overlapped memberships in multiple SAIC divisions (Thun, 2006). In general, managers in each SAIC subsidiary report detailed financial and operational information to the group's HQ on a day-to-day basis. This practice, together with dispatching HQ delegates to each division annually (or semi-annually) for inspection and evaluation purposes, forms bases with which the SAIC HQ can effectively monitor sub-group units' performance and coordinate their internal resources. The SAIC Group has also initiated group-wide workshops and training programs for its employees on a regular basis in order to encourage inter-divisional interactions at all employment levels.[43]

All in all, the SAIC Group has developed an internal hierarchy, where the strict top-down management system and the inter-divisional horizontal resource and information sharing channels coexist. Such a group governance system has been a critical asset in carrying out a series of its self-branded new vehicle development projects. Under the leadership of the SAIC Motor division, the SAIC Group has successfully integrated its various technological assets from multiple channels—such as ex-Rover technology (SAIC Motor), ex-MG technology (Nanjing-MG), and

[42] Interview #2.
[43] Interview #19.

Ssangyong Motor—to develop 11 SAIC-branded passenger vehicle models based on six platforms by September 2010 (Table 3-4). For those projects, the SAIC Group has mobilized key engineers from multiple divisions to form group-wide project teams. For example, on annual average around 40 Ssangyong Motor engineers were transferred to SAIC Motor's Shanghai R&D center to work on the Roewe C200 project, a four-wheel drive sports utility vehicle model launched on the market in September 2009.[44] Since 2007, the SAIC Group has operated an intranet-based common knowledge base system covering the whole group including Korea-based Ssangyong Motor in order to encourage group-wide sharing of knowledge such as drawings, technical notes, and so on.[45] Also, the R&D resource integration (both physical and human resources) is under way between SAIC Motor and Nanjing-MG.[46]

Table 3-4: Details of SAIC's Own Brand Model Development Projects

Platform	*Type*	*Brand*	*Models*	*Market Debut*	*Base Technology*
No. 1	Four-wheel drive (4WD) layout for SUVs	Roewe	C200	Sep 2009	Ssangyong
Nos. 2 & 3	Front-wheel drive (FF) layout for mid-sized sedans	Roewe	350 450 550 750 BP21 750H	Dec 2009 Dec 2008 Jul 2008 Oct 2006 Jun 2010 Sep 2010	Rover
Nos. 4 & 5	Front-wheel drive (FF) layout for compact-sized sedans	MG	5Z 7Z	Jun 2009 Sep 2009	Nanjing-MG
No. 6	Front-wheel drive (FF) layout for compact-sized coupes	MG	3Z TF	Sep 2008 Jun 2009	Nanjing-MG

Note: This table is the same as Table 2-4 of Chapter 2.
Source: Interview #19 and Zhang (2009).

[44] Interviews #15 and 19.
[45] Interview #19; Spec Watch Korea (2009).
[46] Interviews #19 and 25.

4.3. First Automotive Works (FAW) Group

The second case study firm is FAW, which has the longest vehicle manufacturing history in China.

4.3.1. Brief History

FAW is the oldest Chinese automaker, established in 1953. The firm is a centrally controlled SOE headquartered in Changchun, the capital city of Jilin Province. The Chinese central government initially chose the remote northern city as the home for the nation's first vehicle manufacturing plant for two reasons. One was Changchun's substantial industrial assets inherited from the Japanese-controlled Manchurian State.[47] The other reason was its geographical proximity to the Soviet Union, the major technological source of the then-infant Chinese automotive industry.

FAW began production of its first vehicle *Jiefang (Liberation) CA10* in 1953. This light truck with a loading capacity of four tons was basically a clone of the Soviet ZIS 150 model. For this project, FAW owed the Soviets core vehicle technologies and substantial engineering supports. Over the following three decades, Jiefang CA10 was the only vehicle model that FAW mass-produced, and its cumulative output total reached 1.3 million units, the then-world's record for that vehicle segment (Lee *et al.*, 2006). In 1987, FAW launched its second generation Jiefang model (CA141) with a loading capacity of five tons after a six-year development and production preparation period. This new Jiefang model was developed in-house by the Changchun Automotive Research Institute (CARI), which is currently part of the FAW Group.

FAW also has a longer manufacturing history for passenger vehicles than any other local automakers. It was as early as 1958 when FAW produced its first sedan *Hongqi* (Red Flag). This

[47] Changchun was the capital city of the Manchurian State (Manchukuo), which the Japanese empire indirectly governed through its puppets in northern China between 1931 and 1945.

vehicle project, begun in 1957 on the order of the central government, was initiated to serve top central government officials. Like SAIC's SH760, the initial Hongqi sedan (CA72) was a reverse-engineered imitation of Chrysler's C69 model, launched in the United States in 1955. Until FAW discontinued their production in 1984, it produced a cumulative total of only 1,549 units of the old Hongqi model and its variations (Lee *et al.*, 2006). The Hongqi lineup was revived in 1993 based on Audi technologies, but its production volume remains minimal.

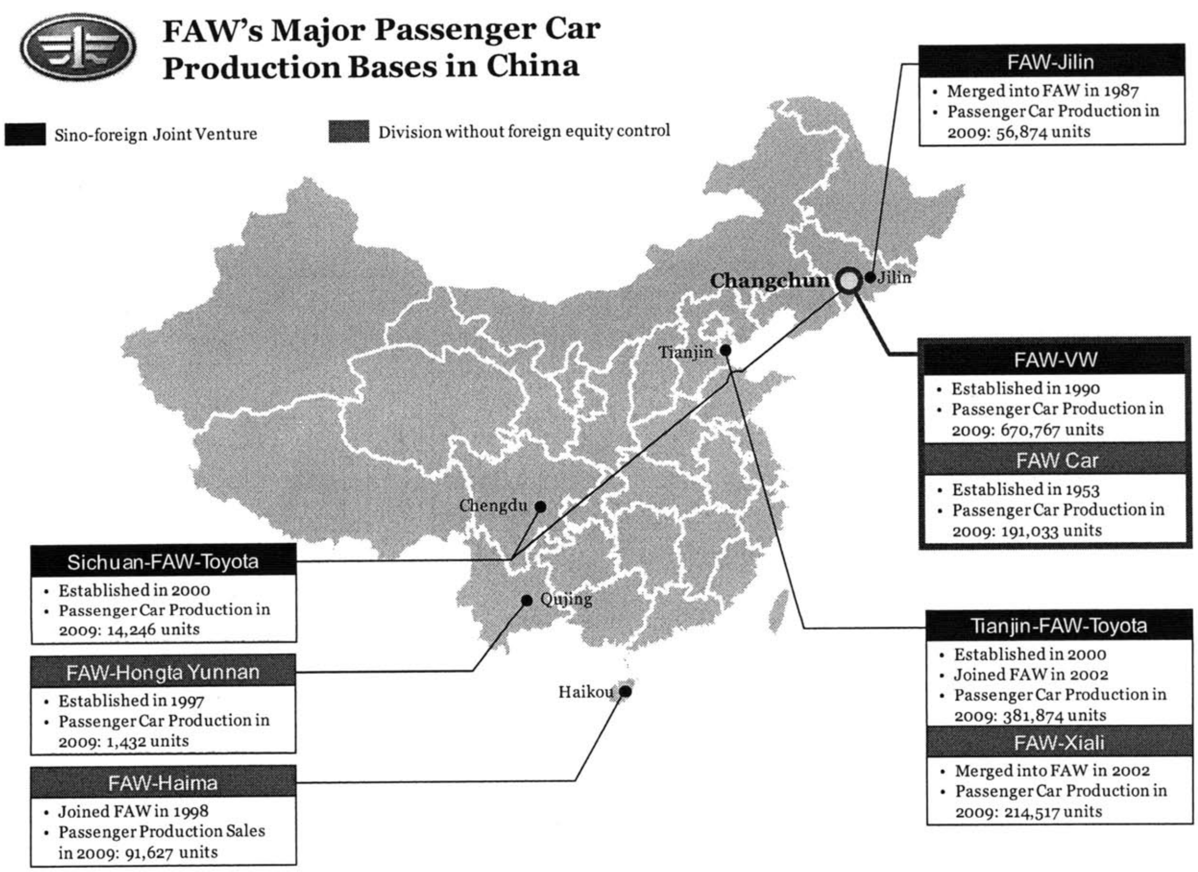

Figure 3-6: FAW's Major Passenger Car Production Bases in Mainland China, 2009

Note: Some commercial vehicle volume may be included in the passenger vehicle production volume statistics.
Source: Created by author; Data from Fourin (2010) and FAW's official website.

Since 1990, FAW has expanded its passenger vehicle manufacturing divisions through IJV partnerships and domestic mergers (Figure 3-6). FAW-VW, the vehicle assembly IJV between FAW and VW established in 1990, is FAW's largest passenger vehicle manufacturing division with an annual production capacity of two-thirds of a million units of Audi- and VW-branded vehicles. Tianjin-FAW-Toyota, an IJV between FAW and Toyota founded in 2002, is FAW's second largest passenger vehicle division; in 2008, it sold over one-third million units of Toyota-branded vehicles. Besides this Tianjin-based division, FAW and Toyota operate Sichuan-FAW-Toyota under a separate IJV arrangement. This operation has two manufacturing plants in Chengdu and Changchun.

In addition the IJVs, the FAW Group has three sizable non-IJV operations. Two of them, FAW-Xiali and FAW-Haima, were affiliated with FAW through mergers with the Tianjin Automotive Group (TAG) in 2002 and with the Hainan Automotive Group (HAG) in 1998, respectively. FAW-Xiali produces licensed Daihatsu and Toyota compact sedans with the Xiali brand, and FAW-Haima manufactures Haima-branded vehicles based on Mazda technologies. FAW Car is also the group's key non-IJV division. In 2009, FAW Car produced a total of 89,088 units of self-branded models based on imported technologies; among them, 88,775 units were the Besturn lineup built on the Mazda 6 platform and the rest 313 units were the new Hongqi model built on an Audi platform and a Chrysler engine.

4.3.2. Macro Analysis: Spatial and Organizational Expansion

For a long period, FAW led the domestic automotive sector as China's oldest and biggest local automaker. FAW's leadership in the sector, however, was seriously challenged since 1986 when DFM excelled in its commercial vehicle production volume and SAIC began to solidify its leading position in the market's fast-growing passenger vehicle segment in the late 1980s. In fact, FAW's growth slowed from the early 1970s, though it was still the largest local automaker. FAW's initial production capacity (30,000 units per year) was expanded twice by 1971, but after then remained approximately the same for the following decade (Chen *et al.*, 2008). During the same period, FAW's technology development was also stalled. Until it introduced the second generation Jiefang model in the market in 1987, FAW still continued to produce the dated Jiefang trucks and Hongqi sedans, developed in the 1950s. FAW needed to initiate new growth strategies to retrieve its market leadership.

Clinging to its glorious past, FAW's management until recently gave its consideration to group-wide production volume expansion before any other concerns. The main mechanics of FAW's output growth was the JV partnership and domestic merger. FAW-VW and FAW-Toyota, the two IJVs accounting for over two-thirds of FAW's total passenger vehicle volume, are located distant from each other partly due to their different origins. In contrast to the FAW-VW alliance, arranged by the Changchun-based FAW HQ, the FAW-Toyota partnership was originally initiated by TAG, which was affiliated with the FAW Group in 2002. TAG and Toyota jointly operated automotive parts manufacturing plants since 1995, and their partnership extended to vehicle assembly in 2000 by establishing a vehicle assembly JV *Tianjin-Toyota*—FAW-Toyota's predecessor. After the merger between FAW and TAG, part of TAG's equity share in Tianjin-Toyota was transferred to FAW and the assembly IJV was reborn as FAW-Toyota. Accordingly, the FAW-Toyota alliance has been developed centering on Tianjin, distant from the group's home base.

FAW's two sizable non-IJV operations are also located outside FAW's home for similar reasons. First, FAW-Xiali, which produces self-branded compact sedans based on licensed

Daihatsu and Toyota technologies, was part of TAG until 2002. The Xiali division has Tianjin-based self-contained organizational capability, little in need of support from the group's HQ. Second, FAW-Haima, located on the Hainan Island of China's south end, was affiliated with the FAW Group in 1998. The predecessor of Haima is Hainan-Mazda, an IJV established in 1992 between HAG and Mazda, but Mazda fully liquidated its equity in the operation by late 2006. At present, HAG and the Hainan provincial government, jointly holding a 51% equity stake, exercise the final management right for FAW-Haima (Table 3-5).

Table 3-5: Major Passenger Vehicle Divisions of the FAW Group, 2009

	Equity Ownership Structure		
SAIC Divisions	*FAW*	*Foreign*	*Others*
FAW-VW	60%	VW: 30%; Audi: 10%	-
FAW-Toyota (Tianjin)	20%	Toyota: 50%	FAW-Xiali: 30%
FAW-Toyota (Sichuan)	50%	Toyota: 50%	-
FAW-Xiali*	48%	-	TAG: 32%; Public: 20%
FAW-Haima	49%	-	HAG: 49%; Hainan Local Gov't: 2%
FAW Car**	53%	-	Public: 47%
FAW-Jilin	100%	-	-
FAW-Hongta	51%	-	Yunnan Hongta Group: 30%; Yunnan Light Vehicle: 19%

Note: * FAW-Xiali was listed on the Shenzhen Stock Exchange in 1999.
** FAW Car was listed on the Shenzhen Stock Exchange in 1997.
Source: CATARC (2009); firm websites.

One thing noteworthy in FAW's growth pattern is that it has involved substantial organizational and spatial expansion at the same time. Now the FAW Group manages a large number of functionally overlapped divisional units throughout the nation. The inter-divisional organizational ties within FAW, however, are rather loose. Even after the mergers, each passenger vehicle operation tends to remain as its own rather than as part of the FAW Group, as evidenced by the fact that FAW-Xiali and FAW-Haima still exist as quasi-independent operational units under the significant managerial influences of their ex-equity holders such as TAG (and the Tianjin Municipality) and HAG (and the Hainan provincial government). The FAW HQ has not been active in reforming the group's governing structure as the mergers were primarily motivated by group-wide output capacity expansion rather than other strategic concerns.

4.3.3. Micro Analysis: Internal Hierarchies

Self-branded vehicle development projects may reveal FAW's M-form structure with weak inter-divisional organizational ties. As of 2009, three FAW-affiliated divisions produced seven passenger vehicle models without using foreign brand names (Table 3-6). First, FAW Car produced the Hongqi sedan, upgraded from its original 1953 version, under the FAW brand. The Changchun Automotive Research Institute, now part of the FAW Group, adopted the Audi 100 platform, to which the Chrysler-licensed CA488 engine was fitted, as base technology for the redesigned Hongqi model (Lee *et al.*, 2006). Second, FAW-Xiali introduced three Xiali-branded compact sedan models, based on dated Toyota technologies. The Xiali division carried out only minor local adaptation tasks for the licensed Daihatsu and Toyota models; in fact, discretionary modifications of the licensed technologies beyond certain extents were prohibited under the licensing arrangement. Finally, FAW-Haima built three sedan models with the Haima brand. At least two of the three models were based on previous generation Mazda platforms.

Table 3-6: Self-branded Vehicles Produced by the FAW Group, 2009

Brand	*Vehicle Model*	*Vehicle Class*	*Base Technology*	*Units sold in 2009*
FAW	Hongqi (New)	Full size/Luxury	Audi platform; Chrysler engine	313
Xiali	Xiali	Compact	Daihatsu Charade (licensed production)	150,762
	Vizi (Vitz)	Compact	Toyota (licensed production)	530
	Vela	Compact	Toyota (licensed production)	4,890
Haima	Haima M2	Compact	Mazda 2 platform	5,154
	Familia	Standard	Mazda 323 platform	71,967
	Haima 3	Standard	Adopted in-house-developed HA-VIS 1.8 engine	9,551

Source: CATARC (2009); Interview #23.

FAW's self-branded lineups symbolize the group's divisional technology development approach. Each of FAW's three independent brand divisions has its own research and engineering department: FAW Car depends on the group's main engineering arm *CARI*, FAW-Xiali has its own technical center in Tianjin, and FAW-Haima operates independent R&D facilities in Haikou, Shanghai, and Zhengzhou. There is little evidence, however, of active inter-divisional collaborations within the FAW Group. FAW Car, though the group's central operational unit in self-branded vehicle development, has not shown a critical leadership in mobilizing the group-wide resources. Even after FAW's rebirth as a large automotive business group through a series of mergers, FAW Car, FAW-Xiali and FAW-Haima still depend on their ex-IJV partners or foreign technology licensers (VW, Toyota, and Mazda, respectively) for base product and manufacturing technologies, while neglecting technological cooperation among themselves.

There are several reasons for the substantial organizational distance among FAW divisions. First, TAG and HAG had strong identities of their own as sizable local SOEs. They existed as part of Tianjin and Hainan local municipal governments, respectively. These local municipalities still have substantial influence on the management of FAW-Xiali and FAW-Haima divisions as principal stakeholders. Except partial equity transfer, nothing else changed much. Second, the regionally fragmented group governance system, however, was left largely unchanged given the lack of FAW HQ's strategic concerns (e.g., group-wide synergy for new vehicle development) about the merger, except inflating the group's gross output level. After the merger, the group's HQ replaced part of the management of the group's new division by its own people, while keeping much of the preexisting governing system. Third, each division's managers, though transferred from the group's HQ, were not very active in initiating horizontal resource sharing efforts with other divisions. Divisional managers tended to see other divisions as competitors rather than as members of the same FAW family as many of them regarded their careers at FAW as stepping stones to climb up the hierarchical ladder within the central government or the communist party.[48] Their political promotion is by and large indexed with their management records in FAW divisions. Finally, when intra-group operational units had weak organizational ties, spatial dispersion was a clear disadvantage as it further weakened the group HQ's monitoring and coordination capability.

4.4. Dongfeng Motor (DFM) Group

In this section, I examine the last case firm, DFM Group, focusing on how DFM's IJV-based growth strategy has shaped its intra-group governance pattern and how the governance pattern has affected the firm's in-house technology development performance.

[48] For example, Jiang Zemin (ex-President of China), Li Lanqing (ex-First Vice Premier), Zou Jiahua (ex-Vice Premier), He Guangyuan (ex-Minister of Machine-Building and Electronics Industry), Lu Fuyuan (ex-Minister of Commerce), Rao Bin, and Chen Zutao (Both Rao and Chen are ex-Chairmen of the China National Automotive Industrial Corporation) all served for FAW in the middle of their political careers (Chen *et al.*, 2008).

4.4.1. Brief History

In 1964 the Chinese central government established the Second Automotive Works (SAW), the matrix organization of the current DFM Group, in Shiyan, a small town in Hubei Province. In an objective sense, Shiyan was not well suited as an industrial location, as it was located in an inland mountainous area where road and railway access was limited. Chinese political leaders, however, strategically chose Shiyan as the home for SAW due to the city's locational disadvantage. Given the increased international political tensions in the 1960s (e.g., the outbreak of the Vietnam War and the deterioration of Sino-Soviet relations), they clearly saw the need to build an alternative automotive production base safe from potential external military attacks, in order to make provisions for the case when the FAW production base could not function. A group of FAW engineers were transferred to Shiyan for the national SAW project.

In 1978, SAW began to produce a light truck model, Dongfeng EQ140, after over a decade of preparation, construction, and testing production.[49] Dongfeng EQ140, developed by CARI, was initially planned to replace FAW's dated Jiefang CA10 model, but the central government transferred the model to SAW for actual production (Chen *et al.*, 2008). Compared with FAW, SAW met consumers' needs more closely to broaden its market share by providing more product options (multiple variations of the original truck design) and better post-sales services (in particular, maintenance and repair) (Byrd, 1992). Such a market penetration strategy, combined with its more technologically advanced product, helped SAW take over the market-leading position from FAW in 1986.

The initial form of the DFM Group appeared in 1978 as an SAW-centered but rather

[49] Such a long period was required to build manufacturing plants partly due to Shiyan's unfavorable geographical conditions (Byrd, 1992).

loose alliance of nine local auto producers[50] located in four provinces—Hubei, Sichuan, Guangxi, and Guangdong (Byrd, 1992). Their cooperation was carried out such that member firms assembled SAW-provided knocked-down kits under the Dongfeng brand. In 1981, the Chinese central government formalized the alliance as an independent business group. As DFM's key labor power and functional organizations were inherited from SAW, the group was initially headquartered in Shiyan. However, disadvantages of the location—such as the low transport accessibility, limited land reserves, and weak human resource pool—became a huge burden when DFM pursued its organic growth in the post-reform period. Accordingly, DFM's group HQ, after being relocated twice, is now settled in Wuhan, the capital of Hubei Province.

Since the early 1990s, the DFM Group has expanded its passenger-vehicle segment business mainly through IJV partnerships. At present, all of DFM's four major passenger vehicle divisions are IJVs (Figure 3-7). DFM's oldest assembly IJV is DF-Peugeot Citroën (PSA), established in 1992. As of 2009, DF-PSA produced over a quarter million units of Peugeot- and Citroën-branded vehicles. In 2002, DFM established two IJVs. One is DFM's biggest IJV DF-Nissan; the other is DF-Yueda-Kia, where DFM, Jiangsu Yueda Group, and Kia Motor have equity stakes. DF-Nissan, which operates two manufacturing bases in Xiangfan and Guangzhou, sold over half a million units of Nissan-branded vehicles in 2009, and DF-Yueda-Kia sold nearly a quarter million units of Kia-branded vehicles in the same year. In 2004, DFM established its youngest IJV DF-Honda in partnership with Honda. By 2009, DF-Honda developed an annual production capacity of over 200 thousand units of Honda-branded vehicles.

[50] The nine automakers included SAW.

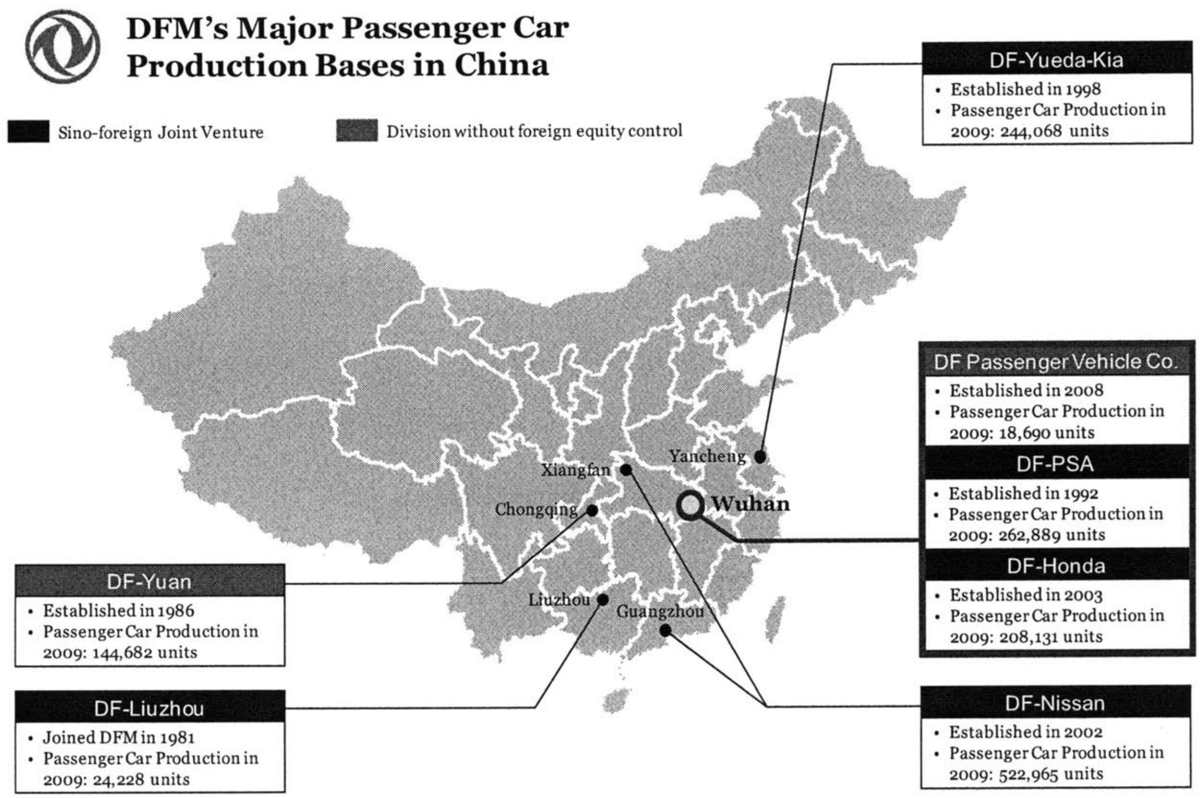

Figure 3-7: DFM's Major Passenger Car Production Bases in Mainland China, 2009

Note: Some local-branded minibuses are included in the passenger-vehicle production volume statistics, shown above.

Source: Created by author; annual output data from Fourin (2009); other information from DFM's official website.

It was not until 2008 that DFM raised the status of its self-branded passenger vehicle development unit to a division level: the DF Passenger Vehicle Company launched its first vehicle model Fengshen S30 in May 2009. The other two divisions shown in Figure 3-7, DF-Yuan and DF-Liuzhou, are dedicated primarily to commercial vehicle production.

4.4.2. Macro Analysis: Spatial and Organizational Expansion

The primary firm growth mechanics for DFM is the IJV partnerships. All of the four sizable DFM passenger-vehicle divisions[51] are OEM assembly IJVs operated in four different cities (Table 3-7; see also Figure 3-7). As discussed in detail in the first chapter, Sino-foreign IJVs by nature exist as independent business entities, rather than as part of local JV partner firms. Considering that DFM, originated from a loose alliance[52] of nine state-owned automotive manufacturing plants, already had a decentralized group governing structure, the IJV-based, spatially disintegrated organic growth further raised intra-organizational distance.

Table 3-7: Major Passenger Vehicle Divisions of the DFM Group, 2009

	Equity Ownership Structure		
SAIC Divisions	*DFM*	*Foreign*	*Others*
DF-PSA	50%	PSA: 50%	-
DF-Nissan	50%	Nissan: 50%	-
DF-Honda	50%	Honda: 50%	-
DF-Yueda-Kia	25%	Kia: 50%	Jiangsu Yueda Group: 25%
DF Passenger Vehicle	100%	-	-
DF-Yuan	50%	-	Chongqing Yuan Group: 50%
DF-Liuzhou	-	-	DF-Nissan: 75%

Source: CATARC (2009).

The Dongfeng Passenger Vehicle Company (DFPVC)—comparable to SAIC Motor and FAW Car divisions in primary charge of SAIC's and FAW's group-wide independent vehicle development projects, respectively—was founded in 2008. The predecessor of DFPVC existed as a functional department within the DF Group HQ before then. Understandably, it was not until May 2009 that DFM introduced its first self-branded passenger-vehicle model (Fengshen S30), the development of which was led by DFPVC. The lack of efforts to create group-wide synergy for in-house technological capability seems to suggest that such a strategic concern did not

[51] DFM's four sizable passenger-vehicle divisions here refer to DF-PSA, DF-Nissan, DF-Honda, and DF-Yueda-Kia.
[52] Here, I use the term *loose alliance* to emphasize that SAW initially functioned as the DFM Group's HQ but the other eight sub-operational units were endowed with substantial managerial autonomy.

function as the primary motivation for DFM's organic growth. The establishment of DFPVC and the launch of Fengshen S30 were, in fact, the outcomes more of the central government's push for independent vehicle development, clearly specified in its 2004 automotive policy, than of DFM's self motivation.[53] The motivation for rapid *extensive* growth based on the addition of new IJV partnerships has primarily determined DFM's spatially fragmented organic expansion. As a DFM manager admitted during the interview, a relatively small operation scale in the passenger vehicle segment (Figure 3-8), compared with those of SAIC and FAW, raised DFM's concern that it might be excluded from the central government's primary preferential policy targets, and such pressure by and large shaped DFM's current M-form structure lacking central coordination functions.[54]

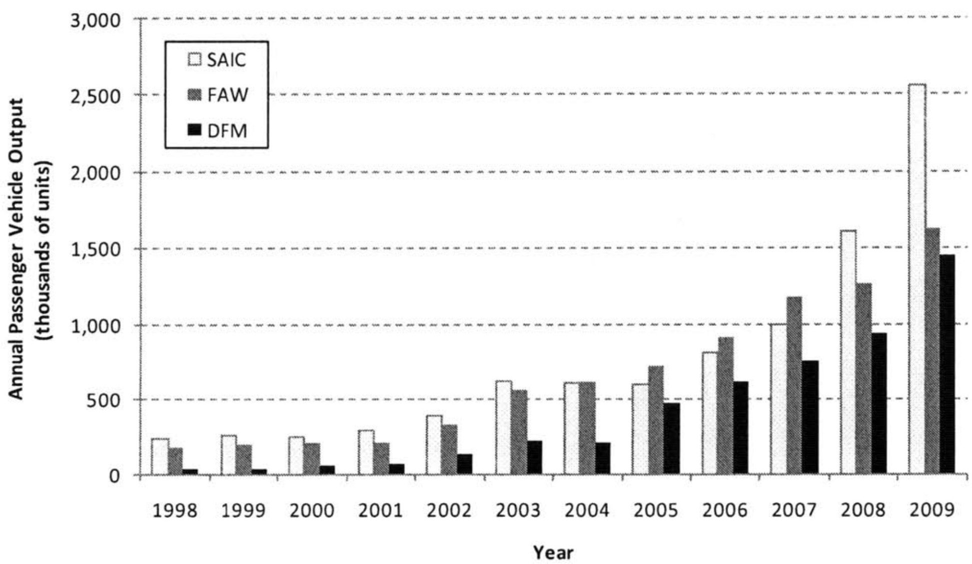

Figure 3-8: Annual Passenger-Vehicle Output by Firm, 1998-2009

Source: Date from Fourin (2009).

[53] Interviews #21 and 23.
[54] Interview #21.

4.4.3. Micro Analysis: New Vehicle Development

Like most other Sino-foreign assembly JVs, DFM-affiliated IJVs also lack in-house technology development capabilities. Each of DFM's four assembly IJVs operates an internal engineering department, but its functionality is limited to secondary engineering support for local OEM production such as minor local adaptation of foreign technologies or vehicle safety testing.[55] This circumstance has seriously constrained DFM's IJV-based technological catch-up. Perhaps foreign automakers, lacking motivations for localizing R&D, are partly responsible for DFM's retarded in-house technology development. DFM, however, should also take part of the blame for the outcome, given the lack of the strategic motivations underlying its IJV partnerships (other than increasing group-wide output) and efforts to raise foreign alliance partners' commitment to local R&D. As evidenced by the SAIC case, the IJV partnership can be a precious asset in building in-house technological capability, particularly when it is accompanied by intra-organizational proximity, managed toward a clear group-wide goal. However, DFM has failed to control intra-organizational distance in its organic growth path.

In 2009, DFM completed its first self-branded passenger-vehicle development project (Fengshen S30). According to several DFM interviewees, the group's IJV experience was of little help for this project.[56] In fact, this project followed one of China's typical vehicle-development formulae—fitting multi-sourced component technologies into a dated vehicle platform under the license arrangement (Table 3-8).[57] The base technology for Fengshen S30 is the PSA-licensed platform for Citroën ZX, whose production in Europe had already ceased in 1998. To compensate

[55] Multiple firm interviews with DFM managers and engineers confirmed that DF-PSA R&D Center (established in 2002; located in Wuhan), DF-Nissan R&D Center (established in 2003; located in Guangzhou), and DF-Honda Development Center (established in 2006; located in Wuhan) were all engaged in minor localization activities.
[56] Interviews #6, 21, and 22.
[57] FAW's Hongqi model was also engineered in a similar way.

for the dated powertrain technology, DFM separately acquired a production license for the engine developed for the Peugeot 307 model[58], and sourced newer transmissions from Aisin and PSA. These separately outsourced powertrain components (and some other key parts) were then fitted onto the platform.[59] The overall and detailed vehicle designs were outsourced to an Italy-based vehicle design and engineering firm *Italdesign*. The primary tasks, done by the DFM HQ and DFPVC in the S30 project, were production engineering and manufacturing, respectively, substantial in-house capability for which DFM already developed through its three-decade-long commercial-vehicle manufacturing experience. This fact symbolically shows that the IJV experience did not add much to DFM's in-house technological capability.

Table 3-8: Details on Fengshen S30, 2009

Vehicle Class	*Base Technology*[*]	*Engineering Sources, etc.*[**]	*Units sold in 2009*[***]
Compact (sedan)	• Platform: Citroën ZX • Engine: 1.6L N6A gasoline (Peugeot 307) • Transmission: Aisin 4-speed AT (automatic) or PSA 5-speed MT (manual)	• Production: DFPVC • R&D: DF Automobile Engineering Research Institute & Technical Center (DFM HQ) • Design outsourced to the Italdesign-Giugiaro S.p.A. (Turin, Italy)	20,889

Source: [*] Firm Interviews; [**] Wang (2009); [***] Fourin (2010).

Besides substantial organizational distance (due to a loose group governance structure and the IJV division's independent internal hierarchy), managerial rigidity, combined with spatial dispersion, has also hindered DFM in its attempts to incorporate IJV experience into the group's

[58] Peugeot 307, whose replacement Peugeot 308 was released in the market in 2007, was produced in Europe between 2001 and 2008.

[59] Some key parts were outsourced from other leading global parts makers including Bosch, Lear, and Delphi (Wang, 2009).

new vehicle development project. Due to its central ownership, the local government (whether for Hubei Province or for Wuhan City) has had only limited degrees of direct influence on DFM's management, and accordingly, the group's organizational growth and localization strategy are not confined to a specific locality. A low degree of spatial clustering, however, is a clear disadvantage in DFM's IJV-based catch-up practice, as proximity-based labor pooling (sharing of IJV-trained human resources) is a main horizontal spillover channel.

In this situation, a brain drain in the local automotive sector, caused by DFM's managerial rigidity, has made the situation even worse. A strong socialist legacy, for example, survives in DFM's standardized seniority-based wage system, where wage margins are narrow among employees engaged in similar tasks. Recently, DFM has been losing its skilled labor and talented engineers to other firms located outside its home base (SAIC is a notable example), partly due to its limited ability to offer them attractive incentive packages.[60] The DFM management recognizes this problem, but little change has been made to their system due to the expected resistance from existing DFM employees, who would not bear too high wage differentials among them.

4.5. Comparative Analysis of the Chinese Big Three Automotive Groups

Over the last two decades, all of China's three largest automakers have experienced rapid growth in terms of both output and organization. Each originated from a single automotive assembly plant but later grew into its current multi-divisional business group having operations in multiple locations. Each group confronts challenges to deal with greater internal organizations and larger

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[60] As an example case, a Chinese automotive magazine journalist told me about a DFM engineer with 20 years of experience, who moved to the SAIC Group with a compensation package four times higher than the one he received at DFM (Interview #23).

geographical space, in order to create group-wide synergy.

Those three business groups, however, have developed different degrees of intra-organizational distance, due to their distinctive growth mechanics. First, SAIC has pursued Shanghai-centered firm growth under the leadership of the group's HQ and the existing SAIC-GM partnership. Accordingly, even after the firm expansion, the SAIC HQ could maintain their tight monitoring and coordination function, and each vehicle manufacturing division could develop a strong identity as part of the SAIC Group. This is also the case for the NAG-SAIC merger, as evidenced by Nanjing-MG integrated to the SAIC Group as part of the SAIC Motor division, rather than as an autonomous operational unit.

Second, FAW's primary growth mechanics has been domestic mergers, accompanied by substantial spatial expansion. FAW's major passenger-vehicle divisions have functioned as quasi-independent operational units with strong self-identities (as the division itself, not as part of the FAW Group); for not only have FAW's mergers targeted sizable local SOEs with long operational histories (thus strong self-identity) but their ex-owners (local governments) also continue to remain major stakeholders even after the mergers.

Finally, DFM employed the IJV-driven growth strategy. DFM's passenger vehicle divisional group has been a bundle of independent firms rather than one organic body as each IJV, by arrangement, functions independent of the group's internal hierarchies. DFM's organizations are not very well spatially integrated, either, due to low intra-organizational interdependency and few valuable location-specific factors in DFM's home location.

SAIC has taken substantial advantage of its intra-organizational proximity in carrying out a series of independent vehicle-development projects (thus, in building in-house technological capability). First, close inter-organizational ties, developed in particular between SAIC and GM through a series of their IJV projects[61], have paved the way for upgrading OEM assembly-centered Sino-foreign strategic alliances into more comprehensive ones, including joint R&D. Such relational assets have functioned as effective boundary spanners, which promote knowledge transfer between GM and its Chinese operations. In contrast, DFM's IJV operation strategy has been the exact opposite. DFM has simply widened its global alliances without deepening them. Accordingly, relational assets that DFM has developed through its IJV projects are not as solid as those SAIC has, though DFM has substantially increased its passenger vehicle output volume through its widened IJV partnerships.

Second, the spatial clustering of SAIC's key operations encouraged horizontal knowledge spillovers, driven by regional labor pooling and inter-firm labor mobility. Although foreign automakers have minimized the possibility of unwanted horizontal knowledge spillovers mediated by their IJV operations, SAIC has incorporated its IJV-based learning by employing ex-IJV human resources for its fully owned subsidiaries. Inter-divisional labor mobility (particularly, from SAIC-affiliated IJVs to SAIC's fully controlled divisions) is higher for SAIC than for FAW and DFM, partly because the SAIC case (inter-firm labor transfer within Shanghai) does not involve any significant changes in living environment from a laborer's perspective, and SAIC's management shows more flexible and active attitudes to attract local talents.

Finally, active knowledge-sharing among SAIC divisions, initiated under the group HQ's coordination, has promoted the group-wide absorptive capacity. SAIC's acquisition of external assets was driven by the strong motivation of internalizing others' strategic resources, and it was followed by group-wide systematic efforts for inter-divisional knowledge sharing. SAIC has

[61] The original SAIC-GM alliance for SGM and PATAC has been expanded to SGM-Dongyue, SGM-Norsom, and SGM-Wuling. Also, SAIC has participated in the management of GM's Korean operation (GM-Daewoo), since 2002, with a 10% stake in it.

successfully integrated its own technological capability, developed through IJV partnerships and acquired ex-Rover operations, with the core competencies residing within Nanjing-MG (MG brand and ex-MG manufacturing assets and product designs) and Ssangyong Motor (independent vehicle development and engineering capabilities) operations under a series of inter-divisional joint vehicle development projects.[62] Joint project teams, whose members are recruited from multiple divisions, are prevalent practices within SAIC, and such inter-divisional interactions have generated key dynamics for mutual learning and knowledge sharing across divisions. SAIC's group-wide intranet system, where the group's sub-operational units can access group-wide intellectual assets such as vehicle drawings and technical documents according to authorization level, has further assisted inter-divisional interactions.[63]

In contrast, FAW and DFM have failed to incorporate division-specific assets at the group level, as evidenced by their independent vehicle development projects. FAW and DFM have had weak motivations for restructuring their preexisting group governance for closer inter-divisional collaboration, on the one hand (as their organic and spatial expansion has been dominated by extensive growth motivations without deep strategic concerns about potential group-wide synergy), ex-local SOEs and IJVs affiliated with FAW or DFM have preferred to remain alone, not as part of the group governance, due to their strong self-identities, on the other hand. As a result, FAW Car and DFPVC, FAW and DFM's central sub-organizational units for self-branded vehicle development, respectively, have maintained their conventional vehicle development architecture, which employs a dated foreign vehicle platform fitted with multi-sourced components as base technology. This fact demonstrates that FAW and DFM have failed

[62] For example, around 40 Ssangyong engineers have been working in Shanghai, under (on average) three-year contracts, for SAIC-branded vehicle development projects (Interviews #19 and 20).
[63] Interviews #15 and 20.

to utilize their organic growth for in-house technological capability-building, in the absence of intra-organizational proximity.

5. Conclusions

Through a comparative analysis of China's three largest automotive business groups, this chapter argues that intra-organizational proximity is crucial when latecomers attempt to create in-house technological edges from external resources. As I pointed out in two earlier pieces, inward (e.g., IJV-based strategic alliance) and outward globalization (e.g., outward FDI) strategies can lead to a better technological catch-up outcome when they are combined: their effective combination helps latecomers establish access to more comprehensive external knowledge resources. Another crucial contributor to the catch-up performance, which I would like to suggest through this study, is latecomers' internal effort to convert acquired external resources into more valuable assets for themselves. The gist of this study is that acquired external resources can be better internalized when a latecomer's organizational growth, led by its asset-seeking inward and outward FDI strategies, is followed by its active internal efforts to maintain or enhance *intra-organizational proximity*.

The SAIC management, as I highlighted throughout, has sought the group's organizational growth while sustaining intra-organizational proximity. In the case of SAIC, spatial expansion has not created serious barriers to creating group-wide synergy as such physical expansion has been well managed by the compact relational space shared across SAIC's key sub-operational units (e.g., multiple geographical operations governed by the SAIC-GM IJV partnership; the Nanjing-MG division consolidated with SAIC Motor's internal hierarchy). Deepened, instead of widened, IJV partnerships have functioned as effective boundary spanners between SAIC and its IJV partners (i.e., foreign JV partners' higher commitment to local technology development), and inter-firm labor mobility, promoted by spatial clustering and managerial flexibility (e.g., SAIC's ability to offer local talents attractive incentive packages), has substantially loosened constraints against IJV-mediated knowledge spillovers toward SAIC. Also, SAIC's acquired domestic and foreign operations have added substantial technological assets to SAIC's own; clear asset-seeking motivations have underlain SAIC's major acquisition, and SAIC has, in fact, encouraged inter-divisional knowledge sharing and integration with various inter-divisional joint projects and knowledge-sharing channels (e.g., human exchanges, group-wide intranet).

In the cases of FAW and DFM, however, there is little evidence that their firm growth has been followed by internal efforts to sustain an optimal degree of intra-organizational distance. With recent organic growth, both firms have developed M-form organizational structures, where each division is spatially and managerially separated from other intra-group parallel divisions. Accordingly, strategic assets residing within sub-operational units have not been effectively mobilized at the group level, as evidenced by both groups' division-isolated own brand vehicle development practices.

As a result, in part, of differing intra-organizational distance management, the technological catch-up performance gap now seems clear between SAIC and the other two groups. On the one hand, SAIC has launched 11 of its self-branded passenger vehicle models built on six in-house-engineered platforms over the last four years. Although four platforms acquired from ex-MG-Rover Group provided the initial starting points of SAIC's technology development for the six platforms, SAIC has added a significant amount of its own in-house technological capability (also mobilized from Nanjing-MG and Ssangyong Motor divisions) so that the dated platforms may be reborn into those matching the contemporary standard technologies. As a GM engineer commented, SAIC Motor's Roewe lineup has now reached SGM's Buick quality.[64] On the other hand, FAW and DFM's self-branded lineups have not made any significant progress from technology development perspectives. FAW's Hongqi and Haima lineups and DFM's recent Fengshen S30 model are all built on foreign-licensed dated vehicle platforms fitted with multi-sourced core component technologies, and FAW's Xiali lineup is simply a re-branded launch of dated Daihatsu and Toyota compact sedans onto the Chinese market under the license production arrangement.

In sum, this comparative case study of China's Big Three automotive groups provides us with three key implications for latecomers, in general. First, spatial proximity, combined with certain managerial practices to raise inter-firm labor mobility, may substantially promote horizontal spillovers between local firms and their foreign-invested operations. Second, the compact relational space, regardless of a firm's spatial expansion, may generate valuable relational capital between local and foreign firms that can be crucial in increasing foreign firms' commitment to local technology development. Finally, when a firm grows substantially, whether in financial or organizational terms, as an outcome of external asset acquisition, its intra-organizational proximity is critical for more effective internalization of the acquired assets. In particular, intra-organizational proximity is critical for (inter-divisional) mutual learning and knowledge integration at the group level.

[64] Interview #2.

6. References

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